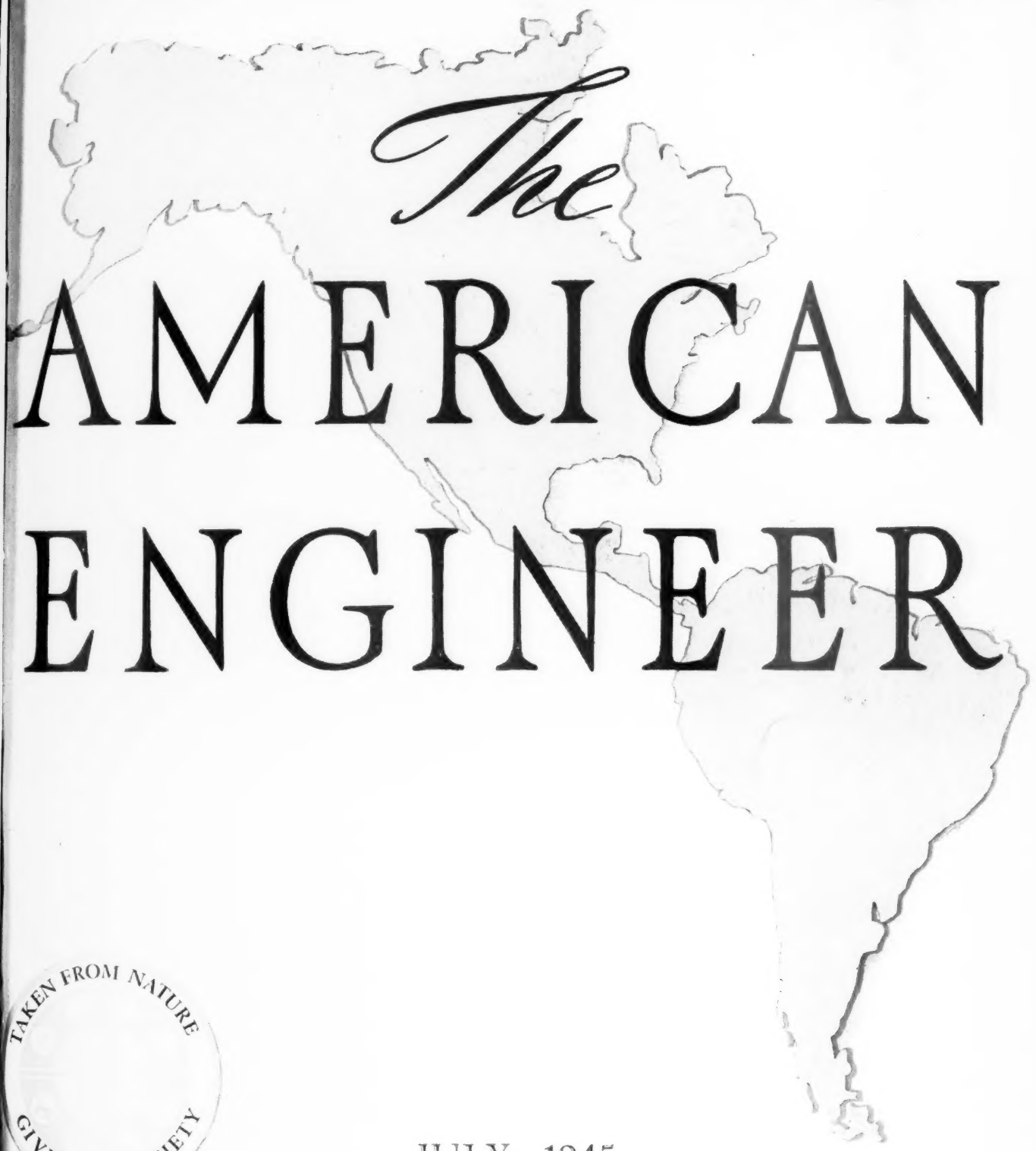
· NATIONAL · SOCIETY · OF · PROFESSIONAL · ENGINEERS ·



The AMERICAN ENGINEER

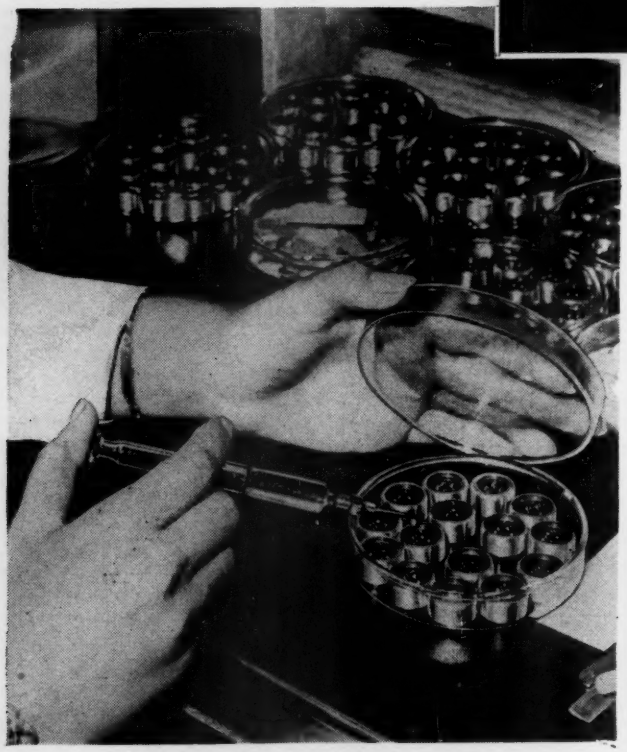
TAKEN FROM NATURE
GIVEN TO SOCIETY

JULY, 1945

Life hangs by such threads

WANTED: Something to keep flyers from freezing. So engineers developed electrically heated goggles, shoes, suits . . . Something dependable to guide pilots in fog and dark. So engineers devised electrically driven gyroscopic instruments. . . . Something automatic to keep engines from overheating or cooling. And now comes an electric control the pilot needn't touch.

Working day and night, G. E.'s research and engineering staff has solved hundreds of such problems. The pictures here show how a few have been met. Through research come better electrical products and processes—in war or peace. *General Electric Company, Schenectady, N. Y.*



Flyers' lives often depend on their instruments. G-E workers use only tweezers to handle these precious parts of electrically driven gyroscopic instruments, dry them with air jets, oil them with hypodermic needles. They've *got* to be accurate.

Eyelids can freeze shut when you're 7 miles up! Electrically heated goggles, developed by G-E engineers, have fine wires embedded in plastic lenses. With G. E.'s electric blanket as a start, G-E engineers designed electrically heated flying suits, heated gloves and shoes being made in three G-E plants. Toughest problem was to devise heated gloves with thin wires strong enough to stand constant flexing.

• • •

Before it's built, they *know* how it will fly! 18,000 horsepower of G-E motors blow winds faster than a pursuit plane can fly. Testing model planes and parts *up to full size and speed* in wind tunnels like this helps get new airplanes perfected quicker.

Making night landings safer. Engineers adapted the G-E "Sealed Beam" auto headlamps into war use—G-E airplane landing lamps 20 times brighter than those on your car. Sealed against dust, dirt and salt water damage, they cut down the peril of high-speed landings.

★

Hear the G-E radio programs: *The G-E All-girl Orchestra*, Sunday 10 p.m. EWT, NBC—*The World Today* news, Monday through Friday 6:45 p.m. EWT, CBS—*The G-E House Party*, Monday through Friday 4:00 p.m. EWT, CBS.

FOR VICTORY—BUY AND HOLD WAR BONDS

GENERAL ELECTRIC

THE AMERICAN ENGINEER

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What of Post War Engineering Education?

What are the Probable Trends?

The present Selective Service policies have caused the student bodies at the several Engineering Colleges in the U. S. to be almost completely wiped out. This has resulted in an ever expanding vacuum in the ranks of the Profession's technicians. Those who will be called on first to begin filling this vacuum are the Engineering Educators. Common sense indicates that provisions should have been made for as many of them as possible to meet and discuss ways and means. However, Mars demanded still more sacrifice. The Annual Meeting of the Society for the Promotion of Engineering Education scheduled to be held in St. Louis in June was ordered cancelled.

In the post war years it is only fair that the Educators should be given the benefit of the best thought of all segments of the Profession. In this connection it should know about and support S.P.E.E. in carrying out its aims and activities.

For the information of American Engineer readers who may not be acquainted with S.P.E.E., the following quotation from a recently issued booklet on "Aims and Organization" should prove of interest:

"Do you know there have been three definitive eras in the evolution of engineering education—the formative era prior to 1893, during which engineering schools were inaugurated and curricula established—the era of program development between 1893 and 1918, during which courses and curricula were expanded and strengthened—and the era of personalized education between 1918 and 1944, during which objectives were defined in terms of student development.

"Are you aware that the S.P.E.E., organized in 1893, has been an active and vigorous Society, stimulating and aiding progress throughout the last two eras.

"Do you appreciate that we are now on the threshold of a fourth era in which there is a growing professional consciousness among engineers and in which unity of action is necessary for the public and professional welfare. The Society has the tradition and prestige to be a powerful agency in this period ahead.

"The aims of the Society have been 'the promotion of the highest ideals in the conduct of engineering education with respect to administration, curriculum, and teaching work, and the maintenance of a high professional standard among its members.' "

One evidence of the fact that the Engineering Educators are giving serious thought to their problems is the now famous S.P.E.E. "Report of Committee on Engineering Education after the War". Among the conclusions reached by this Committee appears this significant phrase, "It is the hope of this Committee that one of the chief results of this report will be the stimulation of educational experimentation among engineering colleges . . ." Not only does the report stress the necessity for mastery of what is labeled "The Scientific-Technological Stem", it also calls sharp attention to "The Humanistic-Social Stem".

That there is something more to Engineering Education than the acquisition of mere technological proficiency is generally recognized. Without this extra something there is grave danger that an individual who is supposedly a learned member of a great profession may become a "moral robot", a term we find extensively used at the moment by journalists in discussing the defiencies of the German mind. It is no use for the Professional Engineers of this country to be smug and feel that there is nothing in this line of thought about which they need be concerned. It will not do for them to say that the integrity of the profession is so well established that it can be counted on to fully discharge its duties to the Public. Mere technical proficiency produced some extremely efficient mass murder and cremation equipment in Germany. It seems inconceivable that this could have been the work of members of the Engineering Profession. It is therefore of paramount importance that Engineering Education in America should provide that something extra which will assure that the professional Engineer will be imbued with such spirit and mental strength that "It can't happen here".

In an article in the October, 1944 issue of The Cornell Engineer, Dean S. C. Hollister in an article on "Cornell's Post War Engineering Plans" points out that "To a constantly widening degree, the engineer has been chosen for managerial responsibilities in industries and public services . . . He must . . . be broadly trained for the economic and humanistic functions in which he will be obliged to participate . . . Certainly he must be adequately trained in the technical aspects of engineering. . . . In addition to this sound technical training his education must be broadened. . . . The engineering faculty at Cornell is convinced that such a program of training is necessary . . . that there can not be a reduction in the amount of technical training . . . that this broarder program . . . can be provided . . . by an extension of the length of the training period. Cornell will, therefore, in the Post-war period abandon its former programs of four-year engineering courses and will, in their stead, offer five-year programs in the four major branches."

Delos M. Palmer, in his article published in this issue on "New Opportunities in Engineering Education". distinguishes between vocational training for aides, training for technicians and education for Professional Engineers. His conclusions, arising out of his experiences both as an educator and as a practitioner, should furnish food for much thought on post war engineering education and its probable trends.

The acquisition of knowledge must be continued beyond the College. We are reminded of this by Dean Lind in his article on "The Value of Research" in this issue.

Engineering Achievements in War and Peace

By LOUIS H. BERGER

Every engineer eventually becomes convinced that no branch of science demands greater accuracy or precision than that required by his particular vocation. It is well that he does. Due to the fact that there is no flexibility, no tolerance for errors, in mathematics, accuracy must necessarily be not only the result, but the eternal foundation upon which engineering is based. As one advances through his engineering studies, he has, of course, had these fundamentals demonstrated to him. He has proven them himself, else he would not now be at his present plane of accomplishment.

Mankind has watched the work of the engineer in this second world war. It should have realized what tremendous effort has gone into military works of offense and defense—some of them soon destroyed. Let us be thankful, much of this effort will remain useful in the years of peace to come. From the emergencies that arise so swiftly during war, we have seen great construction projects quickly effected. From many of them we have learned new lessons in engineering, including new approaches and solutions to problems, that are applicable to constructive progress in peace.

War, itself, has become a matter of precision. Peace from a statesman's viewpoint perhaps, cannot be so precise. But in the field of engineering we are fortunate that we do not have to deal with such unknown quantities as political, economic and sociological differences which upset the balance of nations. Happily enough, in engineering we plan our work and see it gain momentum entirely with the unerring aid of eternal and immortal truths so infallible that if we follow correctly mathematical processes, we cannot fail to produce the result we desire. Precision is not only the goal of engineering, it is its guardian and its guide.

LOUIS H. BERGER

Born. Dorchester, Mass.; Education: Grammar school, private tutors, from Mass. Institute of Technology; Entered his father's business as a partner 1921; *he was elected President of C. L. Bergen & Sons, Inc. on his Father's death,* 1922; *Charter member of American Congress for Surveying and Mapping: Member A.S.C.E. and Member A.S.P.*

Production for engineering use demands interest in and application of many branches of science. As engineering advances, its tools must keep pace with progress. Engineers of tomorrow will determine new and better methods and materials for their work. They will develop increased power sources. For example, in aerodynamics they will discover facts as yet unrevealed. Every branch of engineering will advance.

However we shall have to qualify prophecies with a reminder about the natural physical forces an engineer must meet. Nature can be so logical and precise—as in the orderly movements of the planets and constellations—and nature can also be so unpredictable and so destructive, as we have witnessed in hurricanes, tidal waves, landslides, earthquakes, floods, and volcanic upheavals. Up to now, engineering has not been able to predict precisely when and where these disasters will occur, nor how severe will be the effect. But engineering can and does prepare for such emergencies and when such calamity does strike, it is the engineer who is the restorer and rebuilder, recreating anew with greater strength, and ever basing his work on lessons learned from each new experience.

The engineer of tomorrow is facing a future literally bristling with challenges to his abilities. One does not intend to moralize in these brief remarks; nor to indulge in platitudes about the joy engineers should feel in facing the great opportunities of the post-war world. However it is not true, as some writers would have us believe, that there are no more frontiers. The fact that the era of pioneer settlements in America has gone does not imply that we have pre-empted the paths of progress. Science is forever producing countless new frontiers of discovery. As science advances in each new field of exploration, the trained tool-maker, the designer, the engineer, the laboratory worker—all become frontiersmen, clearing paths for achievements that make life itself more liveable. Speaking of the myriad jobs with which science is concerned, the New York Times recently said in an editorial:

"Any good newspaper man can dream through five columns, of airplanes that will take us for week-end outings in the Himalayas, of cooked food shot through pneumatic tubes from some central kitchen into the

home, of cities roofed over and completely air-conditioned, of plastics that take the place of wood and metal, of synthetic chemicals that nature forgot to make, and of a thousand ways of keeping house or running factories with electric machines still to be invented. These are but the natural evolutions of the contricances we have. They call for some social adjustment, but they no longer make us gasp with wonder. The war alone has accelerated the pace of discovery and inventions, so that the dreams of yesterday are already realities.

"It is the effect of science on world thinking that is important. (The italics are the author's). With civilized mankind everywhere riding in automobiles which are very much alike, bathing in tubs that are alike, reading by electric lamps that are alike, cooking with gas which is everywhere the same, listening to a single radio program that comes from London or New York, and rocking with laughter at the same Hollywood film, it is plain that technology is standardizing the world, and that it is harder than ever to be 'different'."

What one learns in school is indispensable. The careful selection of mechanical equipment is *also* of supreme importance; but it is well to have in mind that there will always be another *priceless ingredient* needed to insure a *winning* combination. Let's call it: *Personal Equipment.*

In the classroom *all* are exposed to study, all using the same methods to the same course of instruction and solve the problems involved; but all do not receive the same marks on their examinations. No two enter school with the same personal equipment and no two leave equally well equipped, *personally.* Generally speaking, the same mechanical equipment—the tangible working tools of the profession are available to all.

Personal Equipment or Personal adequacy is not easily acquired. It is *not* tangible nor visible. It is not constant; but decidedly variable, and elusive. It is not for sale in the market place; but may be acquired or increased in the performance of daily tasks. Like muscular power it is *augmented* by use.

By daily practice of self analysis one can find his weak points and fortify them. One will note the progress he is making in personal adequacy, and as he more and more completely loses himself in his work he will sense a growing power, to overcome the inertia within, to master *more* and *greater tasks,* to develop an *undreamed* of *resourcefulness* and to possibly discover a *dynamic driving force* that will spur him on to accomplish the seemingly impossible.

Today's engineer belongs to the future. The future must depend upon the engineer for fully half of the physical and industrial reconstruction needed all over this globe. Whether it be in a drafting room, in a tool-design department, on some road or bridge-building project, connected with vital research or identified with industrial rehabilitation in or Asia, the post-war job of the engineer is going to be an important part of the whole effort that this unbalanced world must make to get back on an even economic and ethical keel, if civilization is to survive. The engineer is usually a hard-headed person, the nature of his work requires stability, keen thinking, practicality. It is reasonable to believe that if the reconstruction to come were to be left to engineers rather than to politicians, the world would soon arrive at a level of normalcy through the clear-thinking of engineers, and the adequate production of raw materials. Such a course would certainly be a radical one and a new departure from orthodox methods. Civilization is so constituted that certain callings and sciences are interdependent. Therefore, the engineering progress of the future will depend on economics, and vice versa. Since the days of Cheops, the execution of great projects has been a means of employing large masses of enslaved people, or of providing work and wages. It is to be hoped that the immediate years following the end of the present war will be marked by essential rehabilitation and new construction, so planned as to be of permanent economic advantage to the greatest possible number. It is to be hoped that waste of all sort, duplication of effort, and work of only temporary value will be minimized. The engineer would wish it so.

It would take hours to discuss all the possible, feasible and probable projects of the future which will demand the utmost in planning and creative skill on the part of the engineer. We must keep in mind that never before in the history of the world has the engineer faced such a critical and needy civilization. So great will be the demand for technical skill that projects of vast proportions and great magnitude will be literally thrust upon engineers. Such tasks as were formerly entrusted only to seasoned practitioners will invite and test the skill of youthful persons. How this challenge is met will profoundly affect the entire life work of many future engineers. Tomorrow will be the "day of decision."

Some one has said "Hitch your wagon to a Star." I believe there is something more in this slogan than just a flight of imagination, and that if adopted, will make a young man a better engineer. Low aim avails nothing. Let the youthful engineer lift his sights; let him hitch his wagon to some star and hasten the day of application of his training.

There are many reasons why I am glad I was born in America. Among them is the *Atmosphere* of *Achievement* in which we live. One of the reasons this country has been able to accomplish so much in so short a time is that there are so many Americans who, when faced with a seemingly insurmountable obstacle—an apparently impossible task, have been ready to place a wager on themselves.

Recently on the European battleground an American first aid crew was picking up a wounded G.I. Joe. Nearby it saw another so badly shattered and torn by shell fragments that there seemed to be nothing that could be done for him. The crew therefore sent the Chaplain to comfort him in his last moments. The Chaplain bent over him and asked if he had any last message to send back home. This dying man moved and indicating a pocket of his uniform, said: "In that pocket you will find my last sawbuck. I'll bet you that I'll live." He did.

(*Continued on page 27*)

New Opportunities for Engineering Education

By DELOS M. PALMER, *Plant Engineer, Champion Spark Plug Co.*
Former Dean of Engineering Univ. of Toledo, Ohio

In the not too distant future the Colleges of Engineering of this country will be, literally, besieged by many returned veterans and by civilians as well for the opportunity of obtaining an Engineering education. Are the Engineering Educators in these colleges ready to meet the new challenge these young men will bring? Will they be prepared to provide that training and leadership which will be in accord with the needs and aptitudes of these young men?

Without doubt the present war and what we contemplate is ahead of us have caused many teachers and administrators to give serious thought as to what today our aims in technical education should be. Are the Colleges of Engineering to have, based on student aptitude and adjustment, more than one program of study? In answer, at least in part, to the foregoing question, the writer offers briefly for consideration the following curricula:

(a) A curriculum in which the student spends two years in training for any one of the following vocations: Junior Draftsman, Engineering Aide, and Technical Assistant.

(b) The program in vogue for many years in which four years are spent in becoming a well-trained technician.

(c) A new and well thought out curriculum of study, shall we say of six years duration for the present, upon the completion of which the student is graduated with a sound professional background beyond the scope of the technician.

It is quite possible that all three programs just mentioned could not be administered successfully in one institution or under one roof, even though sufficient facilities were available. Too often we neglect one program for another, depending upon interest. The first program could be well administered by Junior Colleges. The second and third programs, in most cases of necessity, could be managed successfully by the same institution.

DELOS M. PALMER
Born, Monroe County, Miss. Education: B.S. in E.E., M.S. in Physics, 1921 and 1938; former Instructor in Electrical Engineering, Kansas State College; Railway Electrical Engineer, Westinghouse Electric and Mfg. Co.; Assistant Professor, Engineering Physics, and Mechanical Engineering, Univ. of Toledo; Assistant to factory manager, Spicer Mfg. Corp., Toledo; former Dean of Engineering University of Toledo, Member N.S.P.E.

Probably these ideas are not new and no doubt some educators will say that they have for many years provided just such programs sumultaneously—a two year program as has been briefly described, a four year program for those who wished to specialize in any one of the branches of Engineering (Civil, Electrical, Mechanical, Chemical, etc.), and a longer program for the Master's and Doctor's degrees, which in some instances simply entailed more time spent in the previously mentioned branches of Engineering.

Whether an advanced program of study, or for that matter an undergraduate program as well, should be organized in a vertical or a lateral sense is open for much argument. It goes without saying that those who graduated from the usual four year course of study were well repaid for their efforts, even though it later turned out that they 'wound up' in a branch of Engineering other than the one in which they worked so assiduously for a degree. I believe there is no argument that the four years spent by these students in an Engineering program were valuable, aside from the knowledge of Engineering obtained, in that proper habits of study were attained, power of analysis and imagination developed, and the value of thoroughness and accuracy appreciated. Dr. C. F. Scott told a group of us at the Westinghouse Teachers Conference of 1922 that probably 90% of the Engineering students upon graduating did not know exactly what they were best fitted to do in Engineering and what most of them did was a matter of opportunity. I have found in my experience that Dr. Scott was right, having observed the record of my classmates and students who graduated under my direction. In regard to students specializing in college, Benjamin G. Lamme once said that it was far more important to learn well in college the fundamentals, for one had a life time in which to specialize. Dr. C. F. Hershfeld, in a similar vein of thought, said to the writer not so long ago that

he, when necessary and within a reasonable time, could become a specialist on the subject to be investigated. My conclusions, from these experiences, point to the necessity of having a program of study which is of a broad, fundamental nature, whether it be the usual four year undergraduate course or a program of advanced nature. The only place the writer can see for a specialized program is in the two year plan. We may not be far off to say that 50% of those who enrolled in college and who withdrew at the end of two years would have been far better off to have take the specialized two year course—for draftsmen, for engineering aides, and for technical assistants.

There is much to be said or suggested relative to a program of study which will lead to professional recognition. Over thirty years ago it was believed by many that a four year program of Engineering Education was sufficient for commencement for the student engineer. Yet after all these years (this is not said as an indictment) we still continue with the accepted four year program as the standard, even though discoveries in physics and chemistry have increased many fold. In this same time, the legal and medical professions have found it necessary, in the advancement of the profession, to extend their programs of academic study from four to seven and eight years. If we think of Engineering as a profession, we should be much concerned that concerted action has not been taken to provide an accepted and broad program of Engineering Education for the student who is professionally minded and is desirous of being more than a technical laborer. Certainly such a broad program of Engineering Education would produce in time Engineers who would be able to draw from a wealth of fundamental knowledge in diagnosing the many and varied engineering problems. Also in this professional program ample opportunity would be provided to engender in the student the professional attitude for the profession and to appreciate the importance of society to him and him to society.

It is not feasible here to elaborate as to what subjects and teaching methods should constitute an accepted professional program of Engineering Education as long as it would be organized on a lateral basis than a vertical one.

Conclusion

No doubt many Engineering Educators would like to embark on new ventures in Engineering Education, but are confronted with such problems as these: Can we carry on successfully a two year program and a four year program in the same institution? Can we extend the usual four year course to five, six, or seven years and have sufficient enrollment to make a go of it? Could we justify the expense of a professional program of six or seven years considering that the enrollment would be small? Concerted thought, planning, courage and action can solve these problems—institutions still doing a fine job in so far as they are able with the facilities they can muster.

The writer sincerely believes that the time is ripe to embark on some new ideas in Engineering Education. When the War is over, for many Colleges of Engineering it is going to be like starting in business all over again. Why not capitalize on our experience? New ideas can be put into practice at no better time.

As far as the professional program in Engineering Education is concerned, why not give the Doctor of Engineering degree for six years of study and as Engineers become more professionally conscious and more appreciative of the value of men trained thusly, the length of the program can be extended. It may sound like rank heresy even to suggest a six year course of study for the Doctor of Engineering degree. Even so, we can take the suggestion for what it is worth.

Considering the thousands who have taken short technical courses during the War, the recent advances in science, unionism, and political implications, the need for a broad professional program of study for the professionally minded student is evidenced now more than ever. In this connection there is a big job for Engineering Educators in selling such a program to qualified students, and rest assured that many vested interests in and out of the Colleges of Engineering will no doubt offer much sales resistance to it. Also NSPE can, in a similar manner as the American Medical Association has done for the Medical Profession, give a lot of thought and guidance as to what it considers a proper program of Engineering Education for future Professional Engineers.

THE EDITOR'S DILEMMA

Getting out a magazine is fun but it's no picnic.

If we print jokes, people say we are silly.

If we don't they say we are too serious.

If we clip things from other magazines, we are too lazy to write them ourselves.

If we don't we are too fond of our own stuff.

If we don't print contributions, we don't appreciate true genius.

If we do print them, the page is filled with junk.

Now, like as not some one will say we swiped this from some other magazine—we did.

AN ENGINEER

By A. M. Trester

(Reprinted from the April Wisconsin Professional Engineer)

An engineer is a person who passes as an exacting expert on the basis of being able to turn out with prolific fortitude infinite strings of incomprehensible formulae, calculated from the results of inconclusive experiments of problematical accuracy by persons of doubtful reliability and questionable mentality for the avowed purpose of annoying and confounding a hopelessly chimerical group of esoteric fanatics referred to altogether too frequently as practical men.

The Value of Research

S. C. LIND, *Dean*

Institute of Technology, University of Minnesota

We do not know how long man has inhabited the earth. But estimates of one or two million years do not seem too great. The trend toward higher estimates has many indirect supports. For our present purposes it suffices to say man must have lived through very long periods of time compared to the vary short ones of which any records or evidence have come down to us.

Against this long and obscure background of existence and slow development stands out in strong contrast his progress in the few centuries just past. Five hundred years ago man did not know the shape nor extent of his own small planet. He was dependent on the winds for navigation, on the horse for transportation, on whale oil for artificial illumination, on the flint for ignition, and on post-mails and messengers for communication. Savages excelled civilized man in methods of quick communication by signalling.

What has brought about in so short a time this marvellous change in man's way of living? In a small fraction of one per cent of the total span of his existence he has multiplied the speed of his transport by forty fold, of his communication by 30 million fold, the power available to man by about a hundred fold, illumination by 100 to 1000 fold. He has even increased the span of his life by two or three fold. The rate of acceleration of his progress is so prodigious as to be almost beyond comprehension. What is the answer but research?

The Greeks and Romans with all of their civilization, art, culture, philosophy, drama, music, oratory and language neglected and even scorned physical experimentation or investigation. Philosophical speculation was the work of scholars and gentlemen; handling material things something for slaves and menials. Experimental science was neglected and unknown.

S. COLLVILLE LIND

Born McMinnville, Tenn.; Education: Washington & Lee Univ., A.B. 1899; *Santini Medalist, Mass. Inst. Tech.; S.B.* 1902 *Dalton Fellow* 1903-1905; *University of Leipsig Ph.D.* 1905; *Hon. D.Sc. University of Colorado, Washington & Lee Univ. and Univ. of Michigan. Former Chief Chemist, U.S. Bureau of Mines; Assoc. Director, U.S. Bureau of Soils; Director, School of Chemistry, Univ. of Minn; Dean, Institute of Technology, Univ. of Minn.* 1935 *to date. Member N.S.P.E.*

When bolder spirits began to break the bonds of blind custom and ignorance strong opposition was met. Dogma feared the light of truth and discovery. Galileo was excommunicated and cast into prison for his assertions. Lavoisier, the father of modern chemistry, was beheaded by his fellow countrymen.

Today an inventor or research worker no longer needs to fear bodily harm but he may suffer much mental and financial hardship before he meets success. But the attitude of the world toward research has vastly changed in the past few decades. In 1900 there was not a single industrial research laboratory in the United States. Today there are 2500.

There are many kinds of research and many kinds of research laboratories. Very broadly research may be divided into two general classes; pure scientific research and applied research. Pure research is carried on by individuals or institutions for the purpose of broadening our basic knowledge of science. Applied research usually has the more direct object of solving definite problems that arise in a given industrial plant or problems common to a number of industries. No sharp dividing line can be drawn between the two. No one can say when a discovery in pure science may be directly applied in industry, nor how deeply applied science may have to delve in pure research to get the right answer. When application reaches the limit of known science without finding the answer, more basic research becomes necessary. It is like a man who hopes to get to shore by wading but when the water gets too deep he must strike out on his own and swim. The better industrial laboratories are prepared to do both kinds of research.

There is no limit to research. One discovery depends on many previous ones and may lead to many others. Ex-Secretary Hughes once said in welcoming an international body of scientists that research is like a crossword puzzle extending indefinitely in all directions without limit. The unknown must be solved from what is already known, but there is never an end. This is the challenge as well as the perplexity of research. To illustrate how one invention depends upon another, think how many fields of invention contribute to the modern automobile. It might be traced back to the discovery of man-made fire, the invention of the wheel, the vulcanization of rubber, the pneumatic tire,

petroleum and gasoline, the internal combustion engine, compression before ignition, the storage battery, the self-starter, lubrication, anti-freeze, anti-knock, high octane gas, etc.

The types of institutions in which research is carried on are: Universities; Government Laboratories; private Foundations, such as the Rockefeller Foundation for Medical Research or the Bartol Foundation for Physical Research; industrial research laboratories, such as Du Pont, Bell Telephone, General Electric, General Motors, Westinghouse, etc.; cooperative industrial research laboratories, such as National Canners, Portland Cement, American Institute of Bakers, Paper Institute and many others; industrial fellowships such as Mellon, Battelle and more recently some of the state and other universities are encouraging industrial fellowships to solve industrial problems; and finally private industrial research laboratories serving the public, such as Arthur D. Little in Cambridge or Miner Laboratories in Chicago.

To illustrate how research has developed in recent times, I quote from an address of President Wickenden of the Case School of Applied Science: "On the old frontiers of geography there was no place for the specialist. The idol of the pioneer was the versatile amateur, the man of knack who could be his own carpenter, his own wheelwright, his own surveyor, his own dentist, and, on occasion, his own obstetrician. Pioneer society had no place for the expert. He was suspected of being a city slicker conspiring to do the plain man out of his rights and property. Today we have the frontier of the laboratory. The philosopher Whitehead reminds us that the greatest invention of the 19th century was *the invention of the method of invention.* Now only specialists have a place on the exploring party.

"This emergence of the research professions in the world of active affairs has brought to a focus an issue of social responsibility. One by one the forces which may shape the postwar world are being called into question. Military power? You can enforce order, but you cannot enforce peace. Statecraft and the arts of diplomacy? The last twenty-five years have been strewn with the wreckage of pacts. Philosophy? Hardly, while the four horsemen of the Apocalypse ride roughshod over the human spirit. Religion? Alas, you cannot dethrone your ideals in order to fight a war and immediately reclothe them with regal authority. Education? Again alas, when the making of fanatics seems to have been so much more efficient than the making of free citizens. Economics? No one knows whether we should pacify the have-nots with plenty and the more inflame their rapacity. Yes, the faith without which we dare not face tomorrow comes hard. . . . .

"The major task of science in the postwar world, I surmise, will be that of supplying an expansive force for our economy. Economists, whose capacity for differing among themselves in most matters is seldom surpassed, seem to agree on one thing—that no static economy can be a prosperous economy. We prosper not by holding on but by getting on. That is a way of saying that producing goods to consume does not in itself supply the volume of purchasing power which true prosperity requires. An added margin is needed, and we get it by increasing our capacity to produce, that is, we take our savings and what we borrow from the future through the mechanism of credit and sluice them through investment in new plants and improved machinery into purchases of goods and into wages which build up the purchasing and saving power of the nation to a prosperity level." . . . .

Of the 2500 industrial research laboratories in the United States most are maintained by companies for their own exclusive use and are not available to others. It has been estimated that of the 182,000 manufacturing companies in the United States probably about 25,000 actually need research. Many of these companies are too small to support their own research laboratories and must rely on the research of organizations which serve the public. In the postwar period the facilities to meet expanding demands for research will be badly overstrained.

Before we discuss what research is and what it can do for us, let us see how others value it and what they have said about it.

Quoting the late Arthur D. Little: "With the world's growing population the only remedy for unemployment is research." T. A. Boyd of the General Motors Research Laboratory has said: "Research is elemental and universal. It is applicable to any field of human endeavor." I quote from a memorandum of the Textile Research Institute of June 1943: "A few wise men, leaders of industry, have a different concept of research. They have proved to their own satisfaction that research is the divining rod of industry. These men know research as the systematic quest for facts and principles applicable to the creation of new wealth. They know that in industry it's the key to larger profits.

"They know that industrial research is organized imagination, ingenuity, inventive genius, common sense, and hard work all rolled into the eight-letter word, 'progress'.

"This research has created and is creating the world we live in. It developed the internal combustion motor, the automobile, the incandescent lamp, aluminum, the phonograph, the motion picture, plastics, the automatic refrigerator. It annihilated distance and boundaries by developing the radio and the airplane.

"The American people will pay money for the industrial progress which research creates. That is the secret which some industrialists have learned to their substantial profit. Many others who thought research 'the bunk' have gone bankrupt."

And again from the same source: "Industries never before thought of as rivals have become competitors in the 1940's because of one thing alone—the discoveries made in research laboratories. And this very fact has made more research imperative."

Nothing is ever so perfect it cannot be improved. If not by you then by your competitor. But do not think that every piece of research work leads to desired results. The per cent of failures or new trials is inevitably high. But even the failures usually teach something of value—if nothing else they show what not to try—and if

done on a laboratory or pilot plant scale they save much time and money. Even wrong theories if put to experimental test may lead to right facts.

Charles F. Kettering has stated that "Research is the organized effort to learn how to do the things you will need to do when you can no longer do the things you do now."

The National Resources Planning Board has recently made a survey to find out what percentage of income different industries spend on research. The result is interesting. Per $100 of gross income, for research:

Organic Chemicals (including Plastics)	$4.00
Rubber Products	2.73
All Chemicals	2.38
Petroleum	1.13
Average of 16 industries	0.64
Textiles	0.06

You will notice the greatest divergence and also that the youngest and most vigorous industries put the greater proportion of their incomes back into research. This is good insurance for the future.

But research to solve problems in a going industry is not the only need that must be filled. Some time, somewhere new industries must be started. One may be based on a new discovery, a new product, or on the introduction of the hitherto unused natural resource. We need many new industries to replace those we have already lost either through the exhaustion of some natural resource such as timber, or those we may lose through approaching exhaustion such as the high grade iron ore, or lose through some changing economic condition. We need new industries to provide employment for war veterans and war workers and to avoid general unemployment.

When a new industrial product has been developed it is first necessary to persuade some one to risk sufficient capital to try it out, to build a pilot plant, which itself may call for a considerable investment. Then if successful on this intermediate scale capital must be willing to face all the difficulties and ventures of launching a new industry. For example, the University of Minnesota has at least three such projects now ready for postwar development: alpha cellulose from aspen or popple wood; hydrogen or water gas from lignite and the newest one, linen fiber by a quick chemical process from flax straw—an almost useless by-product of the flax seed industry. In all three cases the raw material is abundant and now all but unused. It remains to be seen whether capital will undertake the venture now or leave it to the future.

A research problem of such national importance as to deserve our most searching attention is presented by the rapid depletion of our deposits of high grade iron ore suitable for direct use in the blast furnace. The war has greatly accelerated its exhaustion. At the present rate of use it cannot last more than two decades and some companies will deplete their reserves in a few years. Fortunately we have almost inexhaustible stores of lower grade ore which by suitable treatment can be concentrated. But the necessary processes and their combination are still the subject of laboratory research and experimentation in pilot plants. The problem is to reduce the methods to acceptable economic practice before exhaustion of the high grade ore. A problem of conservation is also involved. We should leave in the ground sufficient high grade ore for a future emergency. The production and beneficiation of low grade ore requires so much more material and manpower per ton of finished concentrate that its production could not be rapidly multiplied in case of war as has been so successfully done in stepping up the tonnage of high grade ore to meet present war requirements.

In some universities located near the larger industrial centers an extended system of research service has been adopted. In some cases it follows more or less closely the methods of the Mellon Institute.

There is no doubt but that the interest in and appreciation of the value of research has been growing rapidly in this country. More and more industries are becoming research-minded. It is extending to state legislatures in other fields than agriculture. Stock holders and directors are taking an active interest in the research policies of their companies; banks are promoting research by distributing information about new discoveries and listing problems which need research. Railways are assisting in the development of new industries and in the utilization of natural resources along their right of ways. In fact the general public is beginning and has a right to expect continued contributions to health, comfort and social betterment through research.

Until now we have been considering experimental or laboratory and plant research only. Of course there are many other kinds. For example, historical research aimed not at the discovery of new facts but uncovering old and forgotten ones and correlating them with known facts; sociological research; educational research; economic research. All of these fields are important and deserve our interest and support. Municipal research is especially active at the present time, directed toward the postwar problems which we are soon to face.

In concluding let us look for a moment at the research facilities that will be available in the postwar period. There is an accumulation of problems that need attention. How can we do it? The most serious shortage will come, in fact already exists, in personnel trained for research. Few scientists or engineers are being graduated now The draft has taken all the able bodied young men. There will be an unavoidable gap of several years in the training of men for scientific or industrial research. None of the other world powers have followed such an unintelligent policy as ours. It is sure to be a heavy handicap to reorganization immediately after the war and for some years to come. This situation fortunately will be only temporary. I confidently expect that America will go forward in industrial development and production and that research will show the way to a higher level of living for all our people, including the ones who deserve it most, our returning veterans.

New By-Laws of the N.S.P.E.

Adopted by the Board of Directors Feb. 10, 1945

BY-LAWS

BY-LAW 1 FISCAL YEAR

a. The fiscal year of the Society shall be from January 1st to December 31st.

BY-LAW 2 MEETINGS

a. The Society shall convene once each year during the first half of the month of December, upon the date and at the place to be determined by the Board of Directors.

b. The Board of Directors shall meet not less than three (3) times a year, at times and places to be determined by the Board of Directors. Special meetings of the Board shall be called by the President at the request of a majority of the members of the Executive Committee or of members of the Board of Directors constituting twenty per cent (20%) or more of the votes of the Board. The purpose of such special meetings shall be set forth in the notice to members and no business, other than that for which the meeting was called, shall be transacted.

c. In connection with the Annual Meeting, the Board of Directors shall hold one of its regular meetings. At this meeting, they shall select the members of the Executive Committee for the following fiscal year.

d. The Executive Committee shall meet at the call of the President or upon the written request of two (2) or more members of the Committee.

e. For the purpose of transacting business at the Annual Meeting of the Society, a quorum shall consist of delegates, who are entitled to vote and collectively cast not less than twenty (20) votes, representing not less than five (5) member state societies.

f. For the purpose of transacting business by the Board of Directors, a quorum shall consist of one-third (1/3) of the total number of votes in the Board.

g. For the purpose of transacting business by the Executive Committee, a quorum shall consist of three (3) members, one of whom shall be the President or the Vice-President who is a member of the Executive Committee.

h. The President, or, in his absence, the Vice-President who is a member of the Executive Committee, shall report to the Board of Directors at its regular meetings all actions taken by the Executive Committee and all recommendations which it may desire to make for action to be taken by the Board.

i. Not less than fifteen (15) days' notice in writing shall be sent from the Society's Headquarters to all involved for all meetings of the Board of Directors and the general meetings of the Society, except for meetings of the Executive Committee, notices of which shall be sent when and as necessity requires.

BY-LAW 3 ORDER OF BUSINESS

a. The order of business at all meetings of the Board of Directors shall be —

1. Roll call of members of the Board
2. Seating of acting directors
3. Reading of minutes of previous meeting
4. Reading of communications
5. Reports of officers
6. Reports of committees
7. Unfinished business
8. New business
9. Adjournment

b. The order of business at the Annual Meeting shall be —

1. Roll call of delegates
2. Reading of minutes of previous Annual Meeting
3. Reading of communications
4. Reports of officers
5. Reports of committees
6. Unfinished business
7. Report of Tellers' Committee
8. Introduction of officers elect
9. New business
10. Adjournment

BY-LAW 4 OFFICERS

a. *President.* The President shall preside at all meetings of the Society, of the Board of Directors and of the Executive Committee. He shall be ex-officio, a member of all committees and shall appoint chairmen and members of all standing and special committees, except the Executive and Nominating Committees. He shall conduct the business of the Society under the direction of the Board. The President shall approve of the disbursal of the funds of the Society.

b. *Vice-President.* In the absence or in the inability of the President, the Executive Secretary may request one of the Vice-Presidents to perform any or all of the duties of the President.

c. *Treasurer.* The Treasurer shall receive all moneys paid to the Society and shall make such disbursements as are properly approved. He shall make a report to the Board of Directors at each of its meetings, and an annual report to the Society, of the receipts and disbursements. He shall receive such salary as the Board may from time to time determine. At the expiration of his term of office, the Treasurer shall turn over to his successor all books, papers and moneys belonging to the Society, taking a receipt therefor.

d. *Executive Secretary.* The Board of Directors shall appoint an Executive Secretary, who shall hold office at the pleasure of the Board. He shall perform the usual duties of the office, which shall include keeping an accurate record of the proceedings of the Society, conducting correspondence, and have custody of all official papers and records. In the absence of the President and Vice-Presidents, he shall call meetings to order and call for a motion for the election of a President pro tempore. He shall issue all calls and notices ordered by the President or the Board. He shall attend all meetings of the Board but shall have no vote in its decisions He shall have such other duties and prerogatives as the President or the Board may assign to him. At the Annual Meeting, he shall submit a written report covering the duties and activities of his office, including a statement of the membership of the Society. He shall

receive such salary as the Board may determine. At the termination of his services, he shall turn over to his successor all books, documents or other property of the Society in his custody, taking a receipt therefor.

BY-LAW 5 CONTROL OF FUNDS

a. All funds of this Society shall be deposited in the name of the Society. There shall be established a petty cash account, to provide ready funds for the office of the Secretary at the Society's Headquarters, in the amount to be determined by the Board of Directors. The President shall appoint the administrator of this fund, who shall be empowered to draw checks therefrom. There shall be a general account and a separate publications account. The business manager of "The American Engineer" and the President shall approve all vouchers for expenditures of money in the latter account and shall forward to the Treasurer all moneys received from the publication of the magazine for deposit in the name of the Society. The general account shall be administered by the Treasurer, who shall deposit all funds and draw all checks.

b. To secure the faithful discharge of his duties, the Treasurer shall give such bond as the Board may require. Such other officers, members or employes, charged with the responsibility of handling the funds of the Society, may, at the discretion of the Board, also be bonded. Premiums for all bonds, required by the Board, shall be paid out of the Society's treasury.

BY-LAW 6 COMMITTEES

a. The Standing Committees of this Society shall be —

1. Legislative
2. Public Relations
3. Publications
4. Educational
5. Practice and Ethics
6. Membership
7. Resolutions
8. Budget

b. The President shall appoint such other committees as may be desirable for the conduct of the business of the Society.

c. The duties of the Standing Committees shall include the following:

Legislative:

1. To advise State Organizations, on request, in drafting, securing and improving registration laws.
2. To study existing registration laws and the Model Uniform Law and to suggest desirable amendments and revisions.
3. To keep a record of, and report on, the status and progress of registration laws and their application.
4. To stimulate and strengthen enforcement of registration laws.
5. To keep a record of enforcement cases and court decisions.
6. To assist State Organizations, on request, in any other legislative efforts in the interests of the profession.
7. To follow any national legislation affecting the profession, and to inform and advise the Society thereon.
8. To initiate, draft and sponsor any national legislation desired by the profession.
9. To watch, report and oppose any national legislation tending to subordinate the Engineer or restrict his rights of practice.
10. To confer with other professions and enlist their cooperation in legislative measures of mutual interest or concern.
11. To write and publish articles and reports on Engineers' registration and legislation.

Public Relations:

1. To conduct a planned publicity campaign through newspapers and other recognized media to obtain a favorable reaction from the public on behalf of the engineering profession.
2. To inform the public on the high qualifications of the Engineer, the importance of his services to human progress, the requirements of registration, proper methods of selecting engineering services, and the desirability of appointing engineers in public councils and in high executive and administrative positions.
3. To educate engineers and the public as to the meaning and proper use of the term "Professional Engineer."
4. To conduct a campaign to secure credit for the engineers in connection with the works designed and executed by them, including specific recognition and credit in published accounts and illustration, in dedicatory exercises, on name plates, and on commemorative tablets.
5. To conduct a campaign to stimulate engineering leadership in civic problems and public affairs.
6. To correspond and confer with public officials and government agencies on behalf of the profession in matters affecting the interests of the engineer.
7. To educate the public on the correct place and attitude of the engineer in national economic problems.
8. To secure for the profession its rightful place in social and economic readjustment, planning and progress.

Publications:

1. To exercise general direction of the editorial and advertising policies of "The American Engineer."
2. To assist the Editor in soliciting and securing desirable material for publication.
3. To act as a consultant and advisor to the Executive Secretary and other officers and committees in the editing, planning and financing of any other publications issued by the Society, including reports, educational material and pamphlets, with respect to coordination of form, purpose and scope.

Educational:

1. To confer and cooperate with engineering, educational institutions.
2. To seek continued improvement in the education of engineers.
3. To safeguard and advance the interests of the engineer-in-training and to assist him in his efforts to qualify for registration as a professional engineer.
4. To endeavor to inculcate professionalism through the engineering, educational institutions.

Practice and Ethics:

1. To recommend means to advance and protect the economic and professional interest of the engineer.
2. To formulate ethical standards of the profession and recommend means to maintain and advance them.

3. To recommend means to correct and improve methods of engaging engineering services.
4. To formulate and recommend ways to improve conditions of employment for engineers.
5. To formulate and recommend ways to improve standards of compensation for engineers.
6. To study and recommend to N.S.P.E. means and policies for developing an employment and placement service for engineers and engineering assistants.

Membership:

1. To bring the purposes and program of the National Society before the entire profession in order to enlist endorsement, support and affiliation.
2. To advise the National Society of Professional Engineers ond develpment of membership campaign material.
3. To cooperate with and advise State Societies and their Membership Committees on effective methods of increasing membership.

Resolutions:

1. To receive all resolutions referred to N.S.P.E. for consideration.
2. To pass on all resolutions and recommend the appropriate action.
3. If several resolutions appear on one subject, to harmonize and consolidate such resolutions and recommend the appropriate action.

Budget:

1. To study the financial structure of the Society.
2. To prepare and present to the Board of Directors, for their approval, a budget for the control of expenditures of money by the Society.
3. To review the approved budget and the records of expenditures being made by the Society.
4. To call attention of the Board of Directors to any expenditures over those provided for in the budget.
5. To recommend to the Board ways and means of improving the financial condition of the Society.

d. The Membership and Legislative Committees, except the Chairman thereof, shall be composed of the Chairmen of these committees in the respective Member State Societies and such other members as the President of the National Society may appoint. Their Chairman, in each case, shall be appointed by the President of the National Society.

e. All other Standing Committees, except the Budget, Publications and Resolutions Committees, shall consist of nine (9) members each, three (3) of whom shall serve for the fiscal year 1946, three (3) to serve for the fiscal years 1946 and 1947, and three (3) for the fiscal years 1946, 1947 and 1948. As each of three members' terms expire, their places shall be filled by appointment by the President for 3-year terms. The President shall also appoint the Chairman of each of these committees annually.

f. The Budget, Publications and Resolutions Committees shall each consist of a minimum of three (3) members, who shall be appointed annually by the President. The Chairman of each of these committees shall also be designated by the President.

BY-LAW 7 NOMINATIONS

a. For the guidance of the Nominating and Tellers' Committees, the following schedule of dates for reporting are established:

1. The Annual Meeting of the Society shall be held between December 1st and December 15th each year.
2. The Nominating Committee shall report its list of nominees not later than August 10th, and copy thereof shall be mailed to each State Society within ten (10) days thereafter.
3. The report of the Nominating Committee shall be published in the September Issue of "The American Engineer."
4. Petitions for nominees to be placed on the official ballot, other than those presented by the Nominating Committee, shall be received by October 10th, which is one week prior to the printing of the official ballots, as provided in the Constitution.
5. Official ballots shall be mailed to the membership by October 31st.
6. No ballots received at Society Headquarters later than November 22nd will be counted.
7. Ballots shall be turned over to the Tellers' Committee November 23rd.
8. Official ballots shall be mailed to all members in good standing, together with an envelope marked "For Ballot Only," and a second envelope, across the back of which and including the flap there shall be a line provided for the member to write his name, after having inserted his marked ballot in the envelope marked "For Ballot Only," sealing same, and inserting this envelope in the second envelope, and sealing same. Envelopes containing ballots shall be turned over to the Tellers' Committee unopened.

b. The Tellers' Committee, to whom all ballots shall be turned over for tabulation, shall consist of five (5) members, who shall be appointed by the President. The President shall designate one of these appointees as Chairman of the Committee.

c. The Tellers' Committee shall report at the Annual Meeting of the Society.

BY-LAW 8 MEMBERSHIP

a. Members of the National Society, holding membership in any Member State Society, may transfer their membership therefrom to any other Member State Society without, in any way, affecting their status in the National Society. Members, transferring from one State Society to another, must have their dues fully paid up for the current year, in the Society they are leaving and must be eligible for membership in the State Society which they seek to join. Such members transferring before the end of any year, in order to avoid duplication of the payment of dues, may receive a card from the Society they are joining, granting them the privileges of that Society for the remainder of the current year, and thereafter shall pay the dues required by that Society.

b. Applications for membership-at-large, which is limited to licensing professional engineers in the United States and its possessions, who reside in states or possessions where no Member State Societies exist, may be elected by the Board of Directors upon the recommendation of the Membership Committee. All other membership shall be secured through the respective Member State Societies, and no membership may be secured in states where Member Societies exist,

other than through these State Societies.

c. Application for membership-at-large, not coming under the provisions of "b" above, shall be accepted if acted upon favorably by the Board of Directors.

BY-LAW 9 GOOD STANDING

a. Dues shall become due and payable on January 1st of each year.

b. A member shall be considered in good standing if his dues are remitted prior to the close of December 31st of the year for which such remittance is due.

c. A member failing to remit dues before the close of December 31st of the year in which said dues are payable, shall become delinquent, and if remittance is not made within eighteen (18) months from due date, said member shall be dropped from the membership roll.

d. Only members in good standing shall be carried on the mailing list of "The American Engineer".

e. A former member who has been dropped, to be reinstated, must pay current dues in addition to one year's dues in arrears.

BY-LAW 10 EXPULSION

a. Any member may be expelled, for cause upon recommendation of the Practice and Ethics Committee, by two-thirds (2/3) vote of the entire Board of Directors. No publication shall be made of the expulsion of any member without first referring the matter to the State Society to which the member also belongs, and then only after similar action has been taken by such State Society and then giving him full opportunity to appeal for reinstatement. Such appeal shall act as a stay of publication until final action is taken by the Board of Directors.

BY-LAW 11 DUES

a. Dues shall become due and payable on January 1st of each year. They shall be collected by the Member State Societies and forwarded monthly to the National Society for members of such societies. For membership-at-large, the dues shall be forwarded direct to the National Society Headquarters.

b. The dues for membership in the National Society for members who are also members of Member State Societies shall be four dollars ($4.00) per year through the year 1945. Members joining after January 1st may pay such proportion of these dues as is provided in their State Society Constitution or By-Laws.

c. The dues for membership-at-large shall be ten dollars ($10.00) per year through the year 1945. Members joining before July 1st shall pay a full year's dues. Members joining after that date shall pay six (6) months' dues, except those joining within the last month of the fiscal year, in which case they shall pay dues for the ensuing year.

BY-LAW 12 PARLIAMENTARY PROCEDURE

a. Robert's Rules of Order, as revised, shall govern matters of parliamentary procedure.

BY-LAW 13 AMENDMENTS

a. These By-Laws, or any part thereof, may be amended, as provided in Article VI, Section 4 of the Constitution.

BY-LAW 14 SUSPENSION OF BY-LAWS OF BY-LAWS

a. Any section of these By-Laws may be suspended for a specific purpose and for the duration only of the meeting at which they are suspended, by two-thirds (2/3) vote of the votes represented by the accredited delegates or members of the Board, as the case may be, present at any meeting.

BY-LAW 15 THE FOUR (4) MAJOR AREAS OF THE UNITED STATES for Election of Vice-Presidents shall be as follows:

Western Area	*Northeastern Area*
Arizona	Connecticut
California	Delaware
Colorado	Maine
Idaho	Maryland
Montana	Massachusetts
New Mexico	New Hampshire
Nevada	New Jersey
Oregon	New York
Utah	Pennsylvania
Washington	Rhode Island
Wyoming	Vermont
Hawaii	Virginia
Alaska	West Virginia
Central Area	Dist. of Columbia
Illinois	*Southern Area*
Indiana	Alabama
Iowa	Arkansas
Kansas	Georgia
Kentucky	Florida
Michigan	Louisiana
Minnesota	Mississippi
Missouri	North Carolina
Nebraska	Oklahoma
North Dakota	South Carolina
Ohio	Tennessee
South Dakota	Texas
Wisconsin	Porto Rico

AN ENGINEER'S POSITION IN THE SCHEME OF THINGS

The Medico alleviates pain and restores health as his contribution to mankind's happiness.

The Lawyer relieves mental distress and heartaches attending material entanglements.

But who of the learned professions makes people happy and spreads sunshine over humanity when it is in a normal condition and able to enjoy such fruits and blessings?

The Engineer.

It is he who converts the instrumentalities provided by nature into useable conveniences for the benefit of mankind. It is he who plans and provides proper sanitation, power, fuel, ways and means of transportation and communication for the advantage of man. It is he who designs the conveniences that make the one-time drudgery of housekeeping a pleasant duty. In every truth the Engineer's hand and brain is evident in every factor of present day life that tends to gladden the hearts of men and lessen the burdens of life.

The Doctor is dependent upon the Engineer for the design and supervision of manufacture of delicate instruments so vitally essential in the practice of medicine and surgery. The Lawyer is dependent upon the Engineer for essential facts in vast majorty of civil suits.

Verily the Engineer is a promoter of good and dispenser of cheer and sunshine to mankind.

from The Missouri Engineer.

* * * *

At home a man eats what's put before him and likes it, but in a restaurant he broods over a menu and can't find anything among sixty items that appeals to him.

* * * *

A friend is a person with whom I may be sincere. Before him, I may think aloud.

Ralph Waldo Emerson

* * * *

We'd never start anything if we didn't do plenty of wishful thinking.

* * * *

Those at the top most often wonder why they struggled so hard to get there.

MEMBER STATE SOCIETIES N.S.P.E — *Officers and Directors*

Member	President	Secretary	National Director
ARKANSAS	LEONARD N. WHITE 910 Rector Building Little Rock, Arkansas	DAN D. RICKETTS 219 Terminal Warehouse Little Rock, Arkansas	R. M. NEWSOM Arkansas Highway Dept. Little Rock, Arkansas
CONNECTICUT	LEWIS C. SMITH North Haven, Conn.	ROBERT A. CASTRO 183 Brewery Street New Haven, Conn.	JOHN W. SHALLENBERGER 886 Main St. Bridgeport, Conn.
DELAWARE	RUSSELL D. RODGERS 3115 Van Buren Street Wilmington, Del.	CARL C. STIMMEL R.D. No. 3 Wilmington, Del.	HARRY S. STANTON 2011 Monroe Street Wilmington, Del.
D. C.	FREDERICK W. HILL 6440 Barnaby St., N.W. Washington, D. C.	MAJ. ELMER C. KAUTT 1033 Patrick Henry Dr. Arlington, Va.	HERMAN F. LAME Westchester Apts. Washington, D. C.
GEORGIA	STEPHEN C. HALE 170 Boulevard, S. E. Atlanta, Georgia	RAY L. SWEIGERT Georgia School of Technology Atlanta, Georgia	ROY S. KING Georgia School of Technology Atlanta, Georgia
ILLINOIS	C. J. McLEAN 421-First St. Dixon, Ill.	H. E. BABBITT 204 Engineering Hall Urbana, Ill.	ALEX VAN PRAAG 447 Standard Office Bldg. Decatur, Ill.
INDIANA	M. W. CAMERON 3632 Guilford Ave. Indianapolis, Indiana	J. L. QUINN, JR., *Ex-Sec.* 1098 W. Michigan St. Indianapolis, Ind.	F. A. HENNING 5661 Guilford Ave. Indianapolis, Ind.
KANSAS	D. F. JOSLIN S.B.A. Hill R.R. No. 8 Topeka, Kansas	HAROLD H. MUNGER Kansas State College Box E Manhattan, Kansas	C. H. SCHOLER Kansas State College Manhattan, Kansas
KENTUCKY	JOSEPH C. HERMANN 642 Nelson Place Newport, Kentucky	C. S. CROUSE Univ. of Kentucky Lexington, Ky.	C. S. CROUSE Univ. of Kentucky Lexington, Ky.
MARYLAND	CHARLES A. MOHR 1716 Windemere Ave. Baltimore, Md.	ROBERT ANDREW NORRIS Springfield, State Hospital Sykesville, Md.	RUSSELL B. ALLEN 4610 Hartwick Rd. College Park, Md.
MASSACHUSETTS	WILLIAM F. RYAN Stone & Webster Co. 49 Federal Street Boston, Mass.	ALVIN S. MANCIB P.O. Box 53 West Somerville, Mass.	RAYMOND C. NEWTON Babson Park 57, Massachusetts
MINNESOTA	N. T. RYKKEN 5349 Beard Ave. So. Minneapolis 10, Minn.	RICHARD R. PRICE, Ex. Sec. 1010 Guardian Building Saint Paul 1, Minnesota	S. L. STOLTE 1437 Marshall Avenue Saint Paul 4, Minnesota
MISSOURI	BRUCE WILLIAMS P. O. Box 264 Joplin, Missouri	H. J. BRUEGGING P. O. Box 365 Jefferson City, Mo.	C. P. OWENS State Highway Dept. Jefferson City, Mo.
NEW JERSEY	STEPHEN G. SZABO 813 Lawrenceville Rd. Trenton, N. J.	FREDERICK D. BRAUN 16 North, Hillside Ave. Ventnor City, N. J.	HUGH C. CLARKE 97 Bentley Ave. Jersey City, N. J.	C. GEORGE KRUEGER 85 Van Reypen St. Jersey City, N. J.
NEW YORK	JOS. A. BRADY 39 Osborne St. White Plains, N. Y.	ERNEST F. FOX 1941 Grand Cent. Term. New York, N. Y.	JAMES F. FAIRMAN 4 Irving Place New York 3, N. Y.	LELAND R. POST % N. Y. Tel. Co. Binghamton, N. Y.
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OKLAHOMA	CLARENCE A. STOLDT 410 Commerce Exchange Bldg. Oklahoma City, Oklahoma	M. B. CUNNINGHAM 410 Commerce, Exchange Bldg. Okla. City, Okla	CHARLES S. LARKEY Box 521 Tulsa 2, Oklahoma	
PENNSYLVANIA	SAMUEL BAKER 1616 Jefferson Avenue, Scranton 9, Pa.	RUSSELL S. CONRAD 29 S. 3rd St. Harrisburg, Pa.	J. J. PAINE 1430 N. Euclid Ave. Pittsburgh 6, Pa.	SAMUEL BAKER 1616 Jefferson Ave. Scranton 9, Pa.
PUERTO RICO	C. CALOR MOTA University of Puerto Rico Mayaguez, Puerto Rico	ANGEL SILVA, *Ex. Sec.* Dept. of the Interior Santurce, Puerto Rico	SALVADOR QUINONES 20 East Leland Street Chevy Chase, Maryland	
RHODE ISLAND	FRANCIS W. CULLINAN 90 Pinehurst Avenue Providence, Rhode Island	VINCENT DiMASE 201 Dean Street Providence, Rhode Island	GEORGE J. GEISSER 151 Regent Avenue Providence, Rhode Island	
TEXAS	ELGIN B. ROBERTSON P. O. Box 745 Dallas, Texas	R. S. GUINN 504 Ewell Nalle Bldg. Austin, Texas	T. J. KELLY Box 3190 Beaumont, Texas	W. M. ANDREWS 904 Union Nat. Bk. Bldg. Houston, Texas
VIRGINIA	C. GRADY CATES 417 Arlington Rd. Roanoke, Va.	C. G. MASSIE 4030 Fort Drive Lynchburg, Va.	J. FRANCIS SETTE 4701 Connecticut Ave., N. W. Washington, D. C.	
WASHINGTON	WALTER L. RICHARDSON 1430 — 11th Avenue W Seattle, Washington	MERLIN E. CUSTER 1331 3rd Ave. Bldg. Seattle, Wash.	JOSEPH E. WICKSTROM 761 Empire Building Seattle, Wash.	
WEST VIRGINIA	CHARLES E. SNYDER 721 Mt. Vernon Avenue Fairmont, W. Va.	ROSS B. JOHNSTON, *Ex. Sec.* Kanawha Hotel Charleston, W. Va.	T. J. JACKSON 1203 Augusta St. Bluefield, West Virginia	
WISCONSIN	WILLIAM J. URBAN 3001 West Canal St. Milwaukee 8, Wis.	O. J. MUEGGE 656 Crandall St. Madison 5, Wisconsin	L. E. PETERSON 312 E. Wisconsin Ave. Milwaukee, Wisconsin	

Kindly report any errors or omissions to the Editor.

National and State Society News

ACTIVITIES OF NATIONAL SOCIETY OFFICERS

President Nold recently addressed the Miami Valley Section of the Institute of Chemists at Columbus, Ohio. He also addressed the Dayton Chapter of the Ohio Society of Professional Engineers at Dayton, Ohio. Vice-President Laurie, addressed the Massachusetts Society of Professional Engineers at Boston, Massachusetts. Treasurer Cleary attended the Regional Conference sponsored by the Philadelphia Chapter of the Pennsylvania Society of Professional Engineers at Philadelphia, Pa.

During the months of February, March and April, Executive Secretary Larson made an extensive trip to the West Coast. Thirty-two stops were made: at Columbus, Ohio; Chicago, Illinois; Milwaukee, Wisconsin; Minneapolis, Minnesota; Waterloo, Iowa; Des Moines, Iowa; Omaha, Nebraska; Lincoln, Nebraska; Denver, Colorado; Cheyenne, Wyoming; Salt Lake City, Utah; Boise, Idaho; Spokane, Washington; Grand Coulee Dam, Washington; Seattle, Washington; Portland, Oregon; San Francisco, California; Los Angeles, California; Phoenix, Arizona; El Paso, Texas; Dallas, Texas; Ft. Worth, Texas; Little Rock, Arkansas; Memphis, Tennessee; Jackson, Mississippi; New Orleans, Louisiana; Mobile, Alabama; Atlanta, Georgia; Columbus, South Carolina; Raleigh, North Carolina, Durham, North Carolina; Richmond, Virginia.

On this trip the Secretary delivered nineteen (19) addresses, held over one hundred sixty (160) conferences contacting over a thousand (1000) engineers. A detailed report of this trip will be made to the Board of Directors meeting July 21, 1945.

There will be a meeting of the Executive Committee at the Hotel Statler, Washington, D. C. on July 20, 1945.

There will be a meeting of the Board of Directors at the Hotel Statler, Washington, D. C. July 21, 1945.

The Registration Acts of Georgia, Minnesota and Pennsylvania have been recently amended. Among the provisions covered is Certification of the Engineer-in-Training.

New Jersey Society of Professional Engineers has recently appointed a full-time Executive Director. (Congratulations New Jersey).

The Annual Meeting of the Society for the Promotion of Engineering Education has been cancelled at the request of the O.D.T. (This is too bad in view of the impending vacuum being vested in the ranks of the technicians. It seems reasonable that the educators should have had an opportunity to get together and try to head off this calamity. We will tell you was S.P.E.E. is and does in the July issue. Also somethig about the probable trends in Engineering Education.)

COMMENT BY A READER

The following letter from Leo Teplo, Assistant to the Vice President of Allis-Chalmers Mfg. Co., was received from E. W. Seeger, Vice-President of the Wisconsin Society of Professional Engineers, who, in his letter of submission stated: "Our action in sending it to you is based on (1) the fact that we believe the letter contains quite a lot of good common sense, and (2) there was enough difference of opinion among those who read Mr. Stolte's article regarding the exact meaning, that we thought the issue would deserve some clarification."

P.O. Box 512,
Milwaukee 1, Wisc.
May 3, 1945

Mr. William J. Urban, President,
Wisconsin Society of Professional Engineers,
c/o Falk Corporation
Milwaukee, Wisconsin.

Dear Mr. Urban:

The article entitled "Corporation Practice of Engineering" which appears in the March issue of the American Engineer, is profoundly disturbing in its implications. If professional engineers are to eschew employment by corporations in order to save their professional status, we shall have lost the reality of amazing technological progress to follow the wisp of a misunderstood ghost of professional standing.

The relationship of attorney and client, or doctor and client is not the root of these professions. I believe that there is serious danger of confusing the outward trappings of a profession with its basic foundation. It seems to me that the basis for professional status consists of three things: (1) the acquisition of useful learning; (2) successful survival of such tests as a bar examination, a degree from an accredited school or meeting the registration requirements of various states; and (3) making such knowledge available to society by practicing the profession (a) for a useful purpose, (b) with a keen regard for social welfare, and (c) in conformity with a socially valuable code of ethics.

Professional engineering meets these requirements, whether the engineer be employed as a junior assistant in an engineerng partnership, or holds himself forth as a professional engineer to serve clients personally, or whether he be an employee of a corporation.

To say that an engineer is not worthy of the title of professional engineer because he is employed by a corporation is to attempt to deprive such men as George W. Goethals, Charles F. Kettering, Edwin H. Armstrong and Frank B. Jewett of professional status. If the thousands of engineers who are working for engineering and manufacturing firms are to be denied professional status, then the engineering profession is surely bound to be restricted to an esoteric few.

Our outstanding manufacturing, transportation, mining and communication companies alone today employ thousands of engineers. In fact, most of our engineers today are employees. These engineers are integrated as a

vital part of the organization of these companies and conduct important activities in the fields of research, design, purchasing, production, operaton and administration. It hardly seems reasonable that to save their professional status these engineers must be uprooted from their companies and set up as independent consultants.

If an engineer be considered to lose his professional status because he is employed by a corporation, must not the physician likewise be deprived of professional status if he is employed by a company to serve its employees? What about the status of the renowned medical researchers in such institutions as Johns Hopkins, the Mayo Clinic, etc?

Are these men to be denied professional status? What about professional engineers who are employed by our most renowned educational and research institutions?

It is well known that corporations today employ hundreds and possibly thousands of lawyers. These lawyers remain members of the bar and no one has questioned their professional status. Why should corporation employment of engineers be frowned upon as making those engineers somethig less than professional men?

Whether we consider the question from the viewpoint of contribution to society, standing in the eyes of fellow engineers, or integrity in abiding by a socially valuable code of ethics, there appears to be no reason why an engineer employed by a corporation and engaged in professional engineering work does not have as professional a status as one who practices independently as a consulting engineer.

It is quite possible that Mr. Stolte's article is designed to apply only to firms engaged in the capacity of consulting engineers. I am afraid, however, that many readers may take the article as indicating that no engineer employed by a corporation should be considered a professional engineer. Such a view may seriously injure the entire engineering profession, and I doubt whether the National Society for Professional Engineers would knowingly want to broadcast such a thesis.

Yours very truly,
(signed) Leo Teplow
Assistant to Vice-President.

ARKANSAS

New officers for the year 1945-46 were elected by the Arkansas Society of Professional Engineers on June 22, 1945. They took office on June 22, 1945.

The officers elected are as follows: President, Dan D. Ricketts, 219 Terminal Warehouse, Little Rock, Ark.; 1st Vice-President, W. G. Huxtable, St. Francis Levee Board, West Memphis, Ark.,; 2nd Vice-President, Werner C. Knoop, 328 Gazette Bldg., Little Rock, Ark.,; Secretary-Treasurer, R. M. Newsom, Arkansas Highway Department, Little Rock, Ark.,; Director, Dist. No. 1, B. Frank Beckman, 510 North 22nd Street, Fort Smith, Ark.,; Director, Dist. No. 3, G. W. Swilley, 602 Wesson St., El Dorado, Ark.

DISTRICT OF COLUMBIA

The District of Columbia Society of Professional Engineers held its Tenth Annual Meeting at the Continental Hotel, Washington, D. C. May 28, 1945. The retiring President, Herman F. Lame, acted as Toastmaster. Leo H. Cleary, Chairman of the Tellers Committee, reported the election of the following officers: President — Frederick W. Hill, Elect. Engr., Potomac Electric Power Co., Washington, D. C.; 1st Vice-President — Herbert Manucoia, Civil Engr., U. S. Maritime Commission, Washington, D. C.; 2nd Vice-President — Ivan C. Crawford Jr., Struct. Engr., U. S. Navy Dept., Bd. of Aeronautics, Washington, D. C.; Secy-Treas. — Maj. Elmer C. Kautt, U. S. Army Adj. General's Office; Nat. Director — Herman F. Lame, Consulting Engineer, Washington, D. C.; Alt. Nat. Dir. — Abel E. Landell, Elec. Engr., U. S. Engr. Office; Board of Directors — 2 yrs. — William J. Lynott, Elec. Engr., French Purchasing Commission, Washington, D. C.,; 3 yrs. — C. Warren Bogan, Consulting Engr., Washington, D. C. 1 yr. — Russel Ackor, Elect. Engr., Washington, D. C.

GEORGIA

High light in the news of the Georgia Society of Professional Engineers for June is the progress that is being made in the organization of chapters. Two new chapters are about to be added to the two already in existence.

Although the Georgia Society has not been able to hold scheduled meetings of its own because of ODT travel restrictions, it has maintained some program activity by sponsoring quarterly programs jointly with the Atlanta Chapter. The GSPE Board of Directors meet regularly, however, each month and committee activities are being pressed vigorously.

The Membership Committee, headed by J. E. Mellett, has submitted applications in the first six months of this year representing an increase in membership of approximately 30 per cent.

The Ethics and Practice Committee headed by Professor R. S. King is making an extensive study of a proposed schedule of engineering fees and salaries to be recommended by the Georgia Society. Several preliminary reports have already been made to the Board of directors and it is anticipated that a final report will be made and adopted at the July meeting of the Board of Directors.

ATLANTA CHAPTER has been holding monthly meetings with programs of a high quality. Subjects and speakers are selected with a view of providing members with important information bearing upon the professional status of engineers and upon their opportunities for self development. Typical of the programs are those presented at the last two meetings. At metting held on May 25, the guest Speaker was Brig. Gen. R. F. Fowler, of the U. S. Army Engineers, who discussed "The Improvement of our National Water Resources" with special emphasis on work to be done in Georgia. Garland Peyton, director of the Georgia Department of Mines, Mining and Geology, was the guest featured speaker at a meeting held on June 11, his subject being "Some Opportunities for Development of Mineral Industries in Georgia."

SAVANNAH CHAPTER held its "First Anniversary Dinner Meeting" at the DeSoto Hotel on May 11. Among the guests and speakers at the head table were Albion M. Gruber, second vice president of GSPE; Charles Musante, of the State Port Authority; Stephen C. Hale, president of GSPE; The Hon. Thomas Gamble, mayor of the City of Savannah; Col. C. T. Hunt, of the U. S. Army Engineers; and Col. E. George Butler, past chairman of the Industrial Committee of Savannah.

MASSACHUSETTS

On May 23rd the newly reorganized Massachusetts Society of Professional Engineers held what is reported to have been a very splendid meeting. National Vice President Ritchie Lawrie, Jr. made the principal address, discussing with the Massachusetts Society its part in the professional movement. From all reports he had a very enthusiastic audience.

The Society is at work developing a well-rounded program of activities for the coming Fall and Winter seasons.

Election of the following officers was announced: Pres. — William F. Ryan, Asst. Chief Engineer, Stone & Webster Co., Boston, Mass.; 1st Vice Pres. — Chas. A. Kendall, Chief Engr., Turner Const. Co.,; 2nd Vice Pres. — George E. Fox, Chief Engr., Chapman Valve Co.,; Sec. — Alvin S. Mancib; Pres., Alvin S. Mancib Co.; Treas. — L. P. Leathers, Plant Engr., William F. Shrafft Co.; Board Member, R. D. Stauffer, Chief Engr., New England Gas & Elec. Co.,; Board Member, Milton F. Beecher, Research Director, Norton Company.

MISSOURI

The new Code of Ethics proposed by the Missouri Society of Professional Engineers contains considerable food for thought, and is reprinted herewith for the benefit of our entire membership.

PROPOSED CODE OF ETHICS

The MSPE subscribes to and dedicates itself to the strict adherence to the following code of ethics:

(1) To have as our prime motive the advancement of science in general and engineering in particular and to strive to use our ability for the benefit of mankind.

(2) To be ever ready and eager to aid and abet the Missouri State Board of Registration for Architects and Professional Engineers in its functioning and especially in its administration of the law governing professional engineers.

(3) To refrain from undertaking any assignment beyond our capability and unless it is conscientiously determined the task can be successfully accomplished.

(4) To bear an unselfish attitude one toward another, aiding and assisting each other. To be prompt with just and deserved praise and slow to condemn a fellow Engineer and then only on account of lack of his ability or the use of short practices.

(5) To compete for engineering work and employment only on a fair and sound basis.

(6) To seek only just and equitable fees or compensation for professional services and perform such services faithfully, loyally and devotedly.

(7) To be considerate, moderate and dignified in advertising professional capabilities.

(8) To regard the interests of employers and clients on a parity with our own.

(9) To actively participate in civic and charitable programs in order to furnish preliminary professional advice when necessary in order that public works projects may be proposed on a sound engineering basis.

(10) To be ever on the alert to endeavor to impress upon the public that Engineering is a Profession and that an Engineer in fact is a professional man.

MINNESOTA

Ideas have produced progress in the Engineering Profession. But ideas that produce results are hard to find. Particularly is this true in that field of the professional's activities which deal with legislative action. So when an idea is uncovered which has produced real results it is worthwhile to present it for everyone's benefit. Such an idea is the one used by the Minnesota Association of Professional Engineers in promoting the passage of the recent amendment of the Minnesota Engineers' Registration Law. It is a streamlined presentation of nine arguments used and is set forth on a 4" x 8½" card board easily carried in the coat pocket.

NEW JERSEY

INSURANCE FOR THE PROFESSIONAL ENGINEER

The Board of Trustees of the New Jersey Society of Professional Engineers has endorsed a disability group insurance plan, the purpose being to make available complete and stable accident and health coverage. At the June 8th meeting of the Board of Trustees, there was a brief explanation of the plan. This was followed by questions. All objections and criticisms were answered entirely to the satisfaction of the questioners and the Board. A resolution was then offered and adopted, providing that the Society authorize the mailing of a letter endorsing the plan, to each member of the Society.

This is a plan whereby a self-employeed member and those employed by firms of less than 100 employees, may have the broad protection and special features available only on a group basis. Although the plan operates under the group principle, no master policy is issued. Each member who enrolls is issued an individual policy and the premium is collected directly from the insured. Policies will be issued to applicants from any part of the State, as soon as sufficient members under age 60 and in good physical condition have submitted their enrollment.

NEW YORK

On Saturday, June 16th, 1945 President Joe Brady presider over his first Executive Board meeting held in the Engineers' Club in New York City. The important matters before the Board were as follows: 1. A majority of the Chapters of the Society approved the Schedule of Fees and Salaries which has been under consideration by the Society for some time;

2. Some discussion developed on the floor, along with the fees and salaries, relative to some public bodies requiring land surveyors to bid for survey jobs which they had up for consideration. This practice was soundly condemned, and although the Society as a whole will throw its weight behind any movement to persuade public bodies to discontinue this practice, it is pointed out that the means to employ by which this unprofessional practice can be stopped is by all licensed surveyors refusing to enter into competition for this professional work; 3. Another matter discussed was the employment of an Executive Secretary; 4. The Board voted to increase the dues of the State Society from $5.00 to $10.00 per annum, effective January 1st, 1946.

RICHMOND COUNTY CHAPTER: Down on Staten Island, Richmond County Chapter has been instrumental in creating a great deal of favorable publicity and public interest in conducting a sort of open forum in their meetings relative to the question of a bridge or tunnel from Brooklyn to Staten Island. Brooklyn news editors have certainly found out that professional engineers are awake and thinking in that Chapter!

ERIE COUNTY CHAPTER of the New York State Society of Professional Engineers held its regular monthly May meeting on May 21, 1945. President Landers introduced the guests for the evening. They were Mr. Edwin Bundy, Vice-President and Chief Engineer of the Buffalo Niagara Electric Corporation, and Mr. Schuyler Jenkins, President of the Niagara County Chapter of the New York State Society of Professional Engineers.

President Landers installed the new members of the Board of Directors. They are to serve for three years: Arnold Dutton and Park Judah to serve with the following men of the existing board: Cameron Ross, G. Magrum, Carlos Harrington, Edwad Coon.

The new officers for 1945-46 were installed: President — Gust H. Karlsteen; Vice President — Eugene E. Eldridge (Mr. Elkridge asked the cooperation of the membership in regard to the planning of meetings and the assistance on committees and other works of the society); Secretary — John W. Johnson; Treasurer — Arthur B. Weaver.

WESTCHESTER COUNTY CHAPTER held its regular monthly meeting on Tuesday, June 19th at White Plains. A talk on "The Application of Electronics to Precision Bombing" was given by Mr. O. B. Wilson and Mr. Louis Belford, Engineers for Minneapolis Honeywell Corporation. The presentation was accompanied by motion pictures, models, instruments, etc. and was intensely interesting.

There will be no Chapter meetings during July and August.

NASSAU COUNTY CHAPTER: At the final meeting of the Chapter before the summer recess on Wednesday, June 13, 1945, the speaker for the evening was Captain Robert L. Davis, Chief of the Technical Branch of the U. S. Army Engineering Corps. Captain Davis talked on the subect of "The Influence of Modern Engineering Technique on Battle Doctrine."

Captain Davis has not only spent more than two years overseas, but has been in touch with every phase of Military Engineering for the past two years, due to his assignment. This office receives reports from every unit of the U. S. Army Engineering Corps all over the world.

PENNSYLVANIA

PHILADELPHIA CHAPTER. The 11th Annual Meeting and 4th Regional Conference held by the Philadelphia Chapter on May 3rd was outstandingly successful. Despite inclement weather 110 dinner guests were seated and the total attendance for the evening was 150.

President Bush opened the meeting and alternated in conducting the session with Chairman Ray Fuller, of the Regional Conference Committee.

READING CHAPTER. On the evening of June 25th, a special dinner meeting of the Reading Chapter, P.S.P.E. was held at the Berkshire Hotel in Reading to celebrate the recent passage by the State Legislature of Senate Bill 618, now on record as Act 367, substituting a new Professional Engineers' Registration Act for the former one that has been operative since 1927. The new Act goes into effect on June 30, 1946.

The dinner was presided over by Engineer Edgar D. Sibley, who besides being President of the Reading Chapter this year, is also President of the Registration Board for Professional Engineers, in the licensing Bureau at Harrisburg.

The invited guests included the following delegation from the Legislature; State Senator Frank Ruth and Assemblymen W. G. McAtee, A. S. Readinger and Vincent Grant, all of Berks County; and besides these there were present Engineers Samuel Baker, President and Russell S. Conrad, Executive Secretary of the State Society, V. J. Snyder of the Harrisburg Chapter, Vice-President and member of the State Society's Legislative Committee, and Roy M. Fuller of the Philadelphia Chapter, Vice-President and Chairman of the State Society's Ethics & Practice Committee. Also present at the speakers' table was Capt. Frederick H. Dechant, C.E.C., U.S.N.R., former President of the Reading Chapter and of the P.S.P.E. and some time Vice President of the N.S.P.E. — well known as a professional engineer throughout the State.

The main features of the new Act are, — clearer definition of what constitutes the practice of engineering in its various distinct types, the preparation required of the applicant for a Professional Engineer's license, the uniform system of examinations required by the Registration Board, and the recognition of a new class of prospective engineers called "engineers-in-training" as registered applicants for licenses when their practical training shall have been completed.

News items concerning the activities of Chapters and State Societies intended for publication in the American Engineer should reach this office by the first of the month preceeding publication date. Items for our September issue should be in our office by August 1st.

Please address all matter to: —

AMERICAN ENGINEER
6 Church Street
New York 6, N. Y.

Briefs of Interesting Articles

ORGANIZATION OF THE ENGINEERING PROFESSION

The June issue of Electrical Engineering contains a 3½ page article by James F. Fairman, member, N.S.P.E., on the subject of the organization of the engineering profession.

The problem of organizing engineers for the enhancement of the profession has had several proposed solutions during the last few years some of which have been tried with varying degrees of success. In this article, Mr. Fairman, an advocate of an all-inclusive association of professional engineers, states his personal views, and outlines the course of action that may be taken by individuals, to make such an all-inclusive association effective. In his article, Mr. Fairman outlines the steps which he thinks should be taken for the most efficient organization of the engineering profession.

THE ENGINEER'S STATUS IN THE COMMUNITY

Mr. Roy V. Wright, past-president and honorary member, A.S.M.E. and Chairman of the A.S.M.E. Engineers' Civic Responsibilities Committee, made an interesting talk before the Washington, D. C. section of the Society on December 14, 1944 and again before the Cleveland, Ohio section on February 8, 1945, on the subject of the engineer's status in the community. This is reprinted in the June issue of Mechanical Engineering.

He draws attention to the significant statement made by President Hoover in responding to the presentation of the first Hoover Medal in 1931. At that time, Mr. Hoover said: "These great discoveries and inventions have brought great blessings to humanity, but they have multiplied the problems of government, and the complexity of these problems progresses with the increase of our population. Every county government, every municipal government, every state government, and the federal government itself, is engaged in constant attempt to solve a multitude of public relationships to these tools which the engineers by their genius and industry constantly force to the very doorstep of government. And in solving these problems we have need for a large leavening of the engineering knowledge and engineering attitude of mind and engineering method. These problems of public relation are unsolvable without the technical knowledge of the engineer."

In his paper, Mr. Wright outlines engineers' civic responsibilities and describes how the A.S.M.E. Engineers' Civic Responsibilities Committee was set up and how it functions. He outlines the Committee's objectives and describes a measuring stick for public service and gives typical examples of the work done by the Committee.

In conclusion, Mr. Wright says "The contribution that they (engineers) can make by more faithful performances of their civic duties can be of inestimable value to their various communities, as well as to the nation as a whole. Moreover, their prestige and status in the community will be further enhanced to the extent to which they participate constructively in community and public affairs."

AUSTRALIA'S BOOM HINGES ON PRIVATE ENTERPRISE

H. Boden Fletcher, DFC, speaks a serious word against the nationalization of the aviation industry in Australia after the war. In an article appearing in the June issue of Aviation. He says that despite a serious trend of nationalization, Australian air-line operators are planning well ahead for post-war expansion, basing their programs partially upon prospects of receiving at least a part of their equipment from Australian aircraft factories.

He lists the routes proposed for post-war operation, and outlines the plans of some of the individual air-line operators. One Company has an ambitious scheme for an air-mail pick-up service between Melbourne and 270 towns in Victoria, the idea being to deliver the mail by parachutes of the type at present used in military service to drop supplies at low altitudes and to pick it up in much the same way the messages are now picked up by military craft. He draws attention to the fact one company has already placed on order for between $6,500,000 to $9,750,000 worth of Douglas planes for delivery as soon as war conditions permit.

Mr. Fletcher says that opinion is unanimous that commercial aviation has a very bright future in Australia, but that it is feared that nationalization would, to a large extent, stultify the expansion plans reported in his article.

TECHNICAL REPORT ON BRITISH COAL MINING AND RECENT DEVELOPMENTS

In this article, in the June issue of Mining and Metallurgy, Dr. L. E. Young describes the British coal mining industry and what is to happen to it in the post-war period. The future of Britain's coal mining industry is not only Britain's No. 1 headache, but American miners are keenly interested as well, for many of the same problems which now face the British miner have had to be faced here, and will likely have to be faced in the future. The British solution should therefore be suggestive and informative.

The position of Labor is especially significant to all employers and stockholders in American coal mines, particularly in view of the recent complete shut-down of our anthracite mining industry for the period of several weeks.

Dr. Young has been a consulting mining engineer since his resignation as Vice-President of the Pittsburgh Coal Company a few years ago after a connection of more than a decade. Since 1918 he has been continuously identified with the coal industry, and the recommendations and suggestions which he makes in his article are thus of considerable significance.

CONTRACTORS AND RURAL ELECTRIFICATION

According to an article appearing under the above title in Electrical Contracting for June, the author states that both opportunity and *challenge* exist now in the electrification of America's 3,500,000 non-electrified farms. He draws attention to the fact that the farm market is not an idle dream—it is a present reality, and states that this market is created by the Rural Electrification Administration's program, plus the efforts of electric utilities to give the farmer the benefit of electrification.

He estimates that a wiring market of an estimated 750 million dollars' value is now available together with an estimated 3 billion dollars more for electrical appliances, machinery and equipment. He outlines the contractor's opportunity to fit into this vast program, and tells what his responsibility is and how he can approach the market, and what benefits he will derive from it.

He points out that the need for immediate action is imperative, and draws attention to the fact that the expansion of Rural Electrification programs beginning now and carrying on through post-war will stimulate employment, and that the farmers, the electrical industry, labor, and the nation, all stand to benefit greatly from an immediate and aggressive, concerted, cooperative effort to electrify rural America.

SURPLUS MACHINE TOOLS

The June issue of the American Machinist contains and editorial by Mr. Burnham Finney, Editor and Publisher, on the problem of how surplus government-owned machine tools, built during the war, should be disposed of when once their war production usefulness is over. Mr. Finney suggests, and rightly, that so long as these surplus machine tools are idle or in storage, they are of no value; that only when put to work do they constitute a part of our national wealth, and that they should be made available quickly to all classes of users.

He draws attention to the methods planned for use of surplus machine tools in Britain and states that our real surplus problem lies in the 700,000 machine tools over 15 years old that still are part of the facilities of America's metal working shops, and states that these machines should be broken up under the hammer and fed into cupolas.

There is a lot of food for thought in Mr. Finney's editorial.

IRON ORE DISCOVERIES GIVE LABRADOR NEW IMPORTANCE

The Engineering and Mining Journal for June contains an article by an unknown author describing and drawing attention to the discovery of important deposits of iron ore in Central Labrador and the adjacent region to the west, in the Province of Quebec. Labrador, incidentally, is not a part of Canada, but belongs to Newfoundland.

The new iron ore region and the deposits were described by the Dr. J. A. Retty, Chief Geologist for the Labrador Mining and Exploration Company which has done prospecting in these regions. The Company has an agreement with the Newfoundland Government to prospect in approximately 20,000 square miles of territory, comprising the western portion of Newfoundland-Labrador and including the upper basins of the Hamilton and Naskupi Rivers. In the Quebec area, the Hollinger North Shore Exploration Co. Ltd., has a license to prospect in an area of approximately 3900 square miles lying directly north of the Newfoundland-Labrador area at the head waters of the George, Whale and Swampy Bay Rivers. The iron ore zone has been thoroughly explored in several localities and the quality of ore determined.

The article contains much information regarding the results achieved by the surveys of Dr. Retty, who, prior to joining the Labrador Mining and Exploration Company in 1936, was with the Geological Services of the Province of Quebec and of the Dominion Department of Mines and Resources at Ottawa, Canada, where he conducted geological investigations through the northwestern Quebec and Chilbougamau areas.

HOW CAN CHINA BE INDUSTRIALIZED

In the June issue of Mechanical Engineering, K. Y. Chen, Assistant Chief, Far-Eastern Division, United Nations Relief and Rehabilitation Administration, Washington, D. C., has an interesting article with the questioning title "How can China be Industrialized?" In his article Mr. Chen refers to the fact that the Engineering Services of the Foreign Economic Administration, under the direction of Mr. Alex Taub, Chief Engineer, has prepared a detailed guide to the industrialization of China, which includes various projects totalling over 600 plants, factories and transportation facilities, and costing billions of dollars. This plan was printed in the Washington Post of January 7, 1945.

Mr. John Savage, Chief Designing Engineer of the Bureau of Reclamation, Denver, Colorado, has also designed a 10 million k-w hydro electric plant for the Upper Yangtze, which would cost a billion dollars. This was described in the Chinese Nationalist Daily, published in New York, February 9, 1945.

Mr. Chen's article which is a reprint of a paper presented at the February 26, 1945 meeting of the Baltimore section of the American Society of Mechanical Engineers, goes on to outline a five year plan of industrial development for China which would cost a grand total of about 10 billion dollars. This, he says, is a minimum plan and for the good of the people should be carried out as soon as the war is over. He also outlines China's capacity to borrow the necessary sum to service the capital of the above amount.

In his concluding remarks, Mr. Chen says "Engineers will have an ever-important position in promoting the economic construction of China and raising the standard of living of the Chinese people necessary to lay the sound foundation of a true democracy in China." He further says "I may add that China is a potential country, not loaded with debts which, with a little help to get started, will sail on peacefully and prosperously."

RUSSIA AND AMERICA ALLIES — OR ELSE . . .

In the June issue of Factory Management and Maintenance, James H. McGraw, Jr., President of McGraw, Hill Co. Inc., has a two-page editorial appearing under the above headline.

In this editorial Mr. McGraw gives us all considerable food for thought. He points out that victory in Europe was won only through the combined endeavor of the United Nations, and that only through sustained joint effort can the fruits of that victory be reaped. He stresses the importance of establishing mutual confidence and lists five of the major areas in which misunderstanding and distrust may be either generated or allayed, in Russian-American relationships.

He ends the editorial with a sober note of warning in which he states that we must succeed in establishing general confidence between the Big Powers, warns that failure to do this will mean the defeat of Japan will merely mark the end of the second in a series of world wars.

STORE COAL FOR NEXT WINTER — NOW

Ralph E. Turner, editor of Power Plant Engineering, has a thought-provoking 3-page article in the June issue of that publication. He draws attention to the fact that the country's stocks of bituminous coal are dwindling, and have shown a general decline since 1942. He shows that the production of bituminous coal this calendar year will be nearly 17 million tons less than in 1944, and that labor difficulties have forced Government operation of mines, Government directives aimed at fair distribution, and other regulations. Fuel use efficiency has been advanced by the National Fuel Efficiency Program, and while the Government is encouraging summer coal storage, it is limiting permitted amounts.

Mr. Turner draws attention to the fact that many medium and small power plants are in urgent need of modernization and improved operating efficiency, and states that "while 'waste-chasers' found numerous cases where the equipment and service was definitely obsolete, war restrictions prevented modernization, a condition which has greatly handicapped the fuel saving problem".

He concludes his article with this advice: "At this time, engineers in power plants can do most toward easing the fuel situation by building up the efficiency of their plants. Modernize in every direction possible, cut down wastes of power and heat, equip the plants with instruments and controls that permit continuous knowledge of physical conditions. Keep a steady record with the purpose of improving operation. Keep in touch with the Co-Ordinator in your area of the National Fuel Efficiency Program, for suggestions on plant betterments. The need for fuel saving is urgent, and requires the cooperation of every fuel user".

ELECTRONIC SALES ENGINEERING

Selling electronic equipment to industry in the post-war years will not be easy, in spite of the progress that has been made during the war. It will require many young men with technical as well as sales training to do the job, says S. S. Eggert, in an article in the June issue of Electronics.

Mr Eggert draws attention to the past experience which has shown the difficulties involved when introducing new things into the consumer market, and states that selling the industrial market is doubly difficult. He draws attention to the fact that electronic sales engineering will require a marshalling of technical as well as economic facts. If the man who must be sold industrial electronics is himself, an engineer, or at least a technician, the man who sells him must therefore be at least a technician if not an engineer.

Mr. Eggert forsees great opportunities after the war for electronic sales engineers and suggests that a basic training in sales engineering offers the young technician an important background for future leadership in the electronic field. Men combining sales talent and engineering experience will always be at a premium, and well-paid, in Mr. Eggert's opinion.

MULTI-PURPOSE DAMS INEFFECTIVE FOR FLOOD CONTROL

A three-page article by C. M. Phillips in the June 23rd issue of the Electrical World appears under the above heading. In this article, Mr. Phillips states that the objectives of flood control and power storage are antithetical, that natural valley storage is obliterated by power developments, that multi-purpose reservoirs may accentuate flood crests, and that flood control is not automatic with the multi-purpose dams and dry basins.

The article is adapted from a paper recently presented at the Atlanta meeting of the Engineering and Operating Section of Southeastern Electric Exchange, and the Article, is supplied with many drawings to sustain Mr. Phillip's contentions. He approaches his subject in a forth-right manner and makes his various points clearly, and gives considerable detail in support of his contentions.

THE IMPROVEMENT OF OUR NATIONAL WATER RESOURCES

On May 25th, Brigadier General Raymond F. Fowler, Division Engineer, U. S. Corps of Engineers, South Atlantic Division, Atlanta, appeared before the Georgia Society of Professional Engineers and gave an interesting address on the improvement of our national water resources, in which he drew attention to the fact that one of the first acts of George Washington as our first President, was to establish an organization known as the Corps of Engineers.

Referring to the subject of the efforts of the Federal Government to improve water resources, he pointed out that tese were originally largely confined to navigation, flood control, and irrigation. Navigation and flood control works were executed by the Army Engineers and the irrigation works by the Reclamation Services.

General Fowler's address was released by the U. S. Army Engineers, 50 Whitehall Street, Alanta, Georgia, and persons interesting in securing copies of it should communicate with that office.

Book Reviews

USES AND APPLICATIONS OF CHEMICALS AND RELATED MATERIALS

Compiled and Edited by Thomas C. Gregory

A key to the chemical and process industries, these volumes provide a quick and accurate shortcut to vital information on the current uses and applications of almost 8,000 important substances in more than fifty leading industries. Because of the wide range of materials and their industrial applications, and the conciseness with which the information is presented, these book will be of great value to chemical engineers, chemical manufacturers and research directors.

These detailed analyses, or "surveys" constitute the body of the two books. In the case of more widely used chemicals like sodium hydroxide and sulfuric acid, the survey requires several pages. On the other hand many newly synthesized substances appear for which only one or two uses are yet known. Such substances are included because they may be of potential importance.

All uses are classified by industries arranged alphabetically. Both general and specific uses are included: the general classification indicates whether, for example, the material acts as reagent, intermediate, solvent, softener, plasticizer, filler, reinforcing agent, reducing agent, etc. The specific classification gives the exact products in the manufacture of which the listed material plays a part.

Vol 1 653 pages Cloth $10.00
Vol. 2 527 pages Cloth 9.00
REINHOLD PUBLISHING CORPORATION

STRENGTH OF MATERIALS

By Alfred P. Poorman

Written and first published in 1925, STRENGTH OF MATERIALS has, for 20 years, been a standard in its field. This is the new fourth edition, just published. Several changes and additions have been made in it.

The relation between the value of the modulus of elasticity in shear and that in tension, for homogeneous isotropic materials has been developed.

On account of the increased use of aluminum, duraluminum and magnesium columns in airplanes and other structures, an article on such columns has been added. Three articles on the derivation and use of parabolic column formulae for steel columns also appears for the first time and is at present one of the most widely used column formulas. The effect of combined beam and column action has been treated, both in analysis and in design. Data on allowable stresses has been changed to agree with the higher values now permitted by authoritative specifications.

In order to facilitate reference to any given problem, the problems have been numbered continuously throughout the book, and as in previous editions, the answers to all problems have been given. A complete index makes the finding of any problem easy and rapid.

314 pages Cloth 5 x 7¾ illustrated $3.00
McGRAW HILL BOOK COMPANY, INC.

MEET THE ELECTRON

By David Grimes

This book is based upon the story of the Electron, as electronics have evolved over a period of twenty years. The author, who enlisted as a private in the Signal Corps of World War I was later commissioned a Lieutenant and appointed the Officer in Charge of Radio at Kelly Field, where he started giving the lectures from which this book has been developed.

In 1918 he was assigned to research investigation of radio navigation on bombing planes, and went overseas to serve British and American forces jointly. He was one of the five officers of the Allied forces chosen to go on radio navigation.

The book contains the answers to many questions that have been asked again and again; the answers to questions many people would like to ask; it makes clear many of the mysteries that have surrounded electronics in simple straight-forward language, and discusses the many technicalities surrounding the subject.

125 pages, cloth, 5¼ x 8, illustrated $2.00
PITMAN PUBLISHING CORPORATION

CHEMICAL MACHINERY

By Emil Raymond Riegel, Ph.D.

"Chemical Machinery" is a collection of exact and useful information relating to apparatus and devices used in the chemical industries. The number of devices which may properly be regarding as implementing these industries is so great that the problem arose of reducing the number described to the practical limits of a single volume of moderate size. Preference has been given to those devices which have general application, that is, which serve a number of diverse chemical processes; highly specialized equipment has been included only occasionally. Furthermore, the devices discussed are of the type which may be purchased from a manufacturer, who then delivers them to the purchaser, or erects them on a selected site, as contrasted to home-made devices. The third restriction is that the devices serve large-scale operations; laboratory equipment is not admitted.

The treatment is primarily descriptive, and the text material is liberally supplemented with drawings and photographs. Whenever possible, the reasoning governing the conception determination of size for an intended erasoning governing the conception of the device, its operation, and the service are given always briefly; here and there the simple fundamental formulas which clarify an explanation at a glance are included. The intention has been to give sufficient theoretical matter to provide the thoughtful reader with a satisfactory understanding of the subjectes treated.

The space allotted to each topic and device is meant to reflect its relative importance; occasionally an extra amount was allowed for devices which hold a promise of expansion, and to novel ones, presumably not yet well known.

The material contained in the text of "Chemical Machinery" was collected from "life", that is, directly from the manufacturers, in conversations with the engineers in charge, or by correspondence, supplemented

by visits to shops and chemical plants, and by assiduous study of manufacturers' catalogs, booklets of instruction, and the general literature. The advice and counsel of qualified engineers was sought at every turn, far and near; many of the chapters were prepared in close collaboration with such engineers; others were reviewed by specialists. With few exceptions, the description and discussion of single devices or of several machines made by one manufacturer were submitted to the engineer or manager concerned for review and correction.

This new volume should find favor with chemical engineers, plant designers and others who have to do with process apparatus.

584 pages, cloth, 6 x 9 illustrated $5.00
REINHOLD PUBLISHING CORPORATION

ALIGNMENT CHARTS

By Maurice Kraitchik

This book is an exposition of the methods and techniques involved in the construction of nomographic charts: the type known as alignment charts. Such charts are based on a combination of mathematical principles and draftsmanship for the representation in graphic form of a mathematical law. Charts are time-savers when a particular equation must be solved repeatedly using different sets of values for the variables.

The opening section of the book provides a review of the algebra, analytic geometry, and determinants necessary for an understanding of the methods of chart construction. The representation of various equations is then discussed and illustrated by means of exercises. Applications are made to the fields of chemistry, engineering, manufacturing, and investments. Some of the charts given are ready for use.

The author was for more than twenty-five years on the Staff of Sofina, Brussels, engaged in the construction of nomographic charts. During this period, he had the advantages of intimate contact with Messrs. d'Ocagne and Soreau, who developed the science set forth in this book.

94 pages, cloth, 6 x 9 $2.50
D. VAN NOSTRANT CO., INC.

PHOTOGRAPHIC SURVEYING

By B. T. Talley, Col., U. S. A., and Paul H. Robbins

Photogrammetry has developed rapidly during the war, and this new book comes at a timely moment. It covers the various adaptations of the science of photographic surveying, and in a practical text, describes the technics of the photographic surveying from the single photograph to the finished map. It contains all the necessary basic data and explains the mechanics of utilizing photographs from which engineering, geological or other scientific information is desired.

The authors developed the text from a simple knowledge of the camera and its uses, with the principles of camera construction, map development and photographic interpretation. Emphasis is placed on the technics dealing with measurements which can be made from photographs and various applications of aerial surveying are fully considered.

Full advantage has been taken of the development of aerial photographs and the refinement of procedures brought about by the war.

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U. H. F. RADIO SIMPLIFIED

By Milton S. Kiver

In this book, Ultra-High Frequency Radio is simply explained in plain English. U.H.F. has proved so valuable in this war that it is certain to play a highly important part in the peacetime developments to follow.

Already, television, amateur radio bands, inter-train communication networks and a new feature called "Citizens Radio" are scheduled by the latest Federal Communications Commission regulations to occupy the ultra-high frequencies.

This book starts right from the knowledge of the principle of ordinary radio circuit and proceeds step-by-step to thoroughly explain the principles and application of the ultra-high frequency radio. The author explains the fundamentals of U.H.F. and all types of U.H.F. equipment, magnetic-oscillators (including the Klystron), wave guides, cavity resumators and antennas, measuring instruments, and many others. Hundreds of illustrations show every detail of the construction and operation of all different apparatus and all other items to assist in mastering the production, measuring, etc. of U.H.F. currents and waves under the widest range of practical conditions.

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PERSONNEL RELATIONS

By J. E. Walters

This book endeavors to set forth accurately principles and practices in personnel administration and industrial relations today, as determined by labor-unions; managements; the government; labor-management cooperation; individual employees; and the most modern personnel relations techniques and procedures. Its vital theme is the successful handling of personnel relations in a democracy, through realistic understanding of what that implies and means for everyone concerned.

Its aim is to offer not merely general discussion, but working principles, policies and methods that can be used by those who must find sound and enduring solutions for specific problems. It makes available a wealth of up-to-date, well-organized facts, figures, history, and results of experience which are a most valuable addition to the user's knowledge of his field.

The author has drawn from his own industrial experience as a personnel relations executive; from study and research as a professor of this subject; from careful investigations of what is being done in hundreds of companies; and from the judgment of many well-known industrial executives, personnel managers, government representatives and officials of labor-unions to whom the statements were repeatedly submitted for criticism and review. By hundreds of specific examples and illustrations of methods which work toward democracy he justifies his confidence that our American way can be both practical and successful in handling personnel relations.

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What's New

(News from industry — gathered by the publisher)

"101 WELDING IDEAS"

This 16-page booklet contains one hundred and one photographs showing how, through the use of welding, maintenance costs in scores of plants and industries can be reduced. It is full of ideas for any maintenance engineer.

For further information, address The American Engineer, reference No. 345.

MOTORS AND CONTROLS FOR HAZARDOUS LOCATIONS

This is a 28-page, 2-color bulletin containing important technical information regarding a line of explosion-proof motors for use in hazardous locations.

Hazardous locations are defined and "explosion-proof" equipment is clearly identified. Underwriters Laboratories design and test requirements and Bureau of Mines design and test requirements are listed. A number of explosion-proof motors are illustrated, and a complete description is given of each.

For further information, address The American Engineer, reference No. 346.

GAS TESTING APPARATUS

A new catalog describing such equipment as recording gravitometer, gas gravity balances, dew-point tester, vapor pressure bomb, specific gravity bomb, dead weight testing instruments, pulsameter, etc. has recently come off the press.

It gives complete specifications and prices for each piece of equipment.

For further information, address The American Engineer, reference No. 347.

COOLANT STRAINERS

Two new models of Coolant Strainers for use in machines equipped with gear pump coolant systems (or centrifugal pumps with intake pipe in tank) are now available. They strain chips and slag from coolant. Protect pumps and gears. Prevent excessive machine wear and defective workmanship due to scoring, etc. Insure constant circulation of chip-free coolant fluid. Easily installed, singly or in multiple, in most machines.

Model C is the cylindrical type. With a diameter of 5 inches and an overall height (including coupling) of 4-5/32 inches, this model is of convenient size that makes it easily adapted to most machines. Model C has a capacity up to 10 gallons per minute, with a ¾ inch pipe. Refills are easily inserted.

Model G, the oblong type, is constructed to remove fine residue such as grindings, lint, etc. from coolant fluid. While designed particularly for grinders and automatic screw machines, Model G gives efficient service in all machines. The filter elements can be easily removed and refills inserted at moderate cost.

For further information, address The American Engineer, reference No. 348.

ELECTRIC WELDED TUBING

This is a 32-page, 2-color bulletin written to and for product designers, to give them a new concept of tubing, a basic material with a wide field of usefulness.

The bulletin contains examples of both wartime and peacetime uses, specifications for various tubing applications, and offers a very complete handbook to engineers interested in the use of tubing.

For further information, address The American Engineer, reference No. 349.

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For further information, address The American Engineer, reference No. 351.

(*Continued on page* 28)

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(*Continued on page 6*)

In that day when the young engineer comes face to face with his big chance, with the overwhelming odds against him, will he be ready to place a wager on himself? Will he say to himself: "If this job can be done, I can do it. For this purpose was I *born, schooled* and *fitted.* I have found my *reason* for *living!*" I believe he will, because he is an *American* enlisted in a profession with a great heritage that he will not only uphold, but will strive to enhance. He will help in the development of processes and methods that up to now have been inconceivable. On him will depend the achievements of not only the engineering profession, but the achievements and the advancement of all mankind.

Pure science is truth. Nearly two thousand years ago, a certain humble Friend of humanity told the little group around him that the truth shall make men free. Himself only a carpenter, His observation about truth is a universal fact. Science, which, as we study and apply it, proves this truth. Engineers have chosen careers that must be founded upon truth as the same is revealed in study and in practice. There is no need to advise men to cleave to the truth, because they cannot separate themselves *from* truth, if they are to be true engineers. New truths, founded on those we know today, will be discovered in the coming years—and it is the privilege of the engineers to make these truths function in their achievements,—the most enduring contribution towards a higher, finer civilization, in a better, more rational world.

BLAW-KNOX COMPANY BUYS BUFFALO FOUNDRY AND MACHINE CO.

Effective May 1st, the Blaw-Knox Company acquired the plant, manufacturing facilities inventory and unfilled orders of the Buffalo Foundary & Machine Co., and will operate the business under the name of Buflovak Equipment Division of Blaw-Knox Company.

A decided advantage occurs to users of Buflovak Equipment. Customers will now have available greater resources, increased manufacturing facilities and broader engineering service and talent.

The same management and personnel will be retained at Buffalo and the Branch Offices.

THE USES OF LIGNUM VITAE

A 12-page bulletin recently released lists a number of uses to which Lignum Vitae is being put for mechanical and industrial purposes. These range from bearings to venetian blind pulleys.

Four pages are required to list some of the principle applications of lignum vitae in industry.

For further information, address The American Engineer, reference No. 353.

JET PUMPS

The recent wide publicity on jet propelled planes and bombs may have created an impression that the jet principle is a new development. Actually, jets have been used for many years, and wherever agitating, mixing, pumping, heating, condensing or circulating is required, there is a piece of jet apparatus suitable for the task.

The manufacturer of this type of apparatus for 70 years, has recently published a bulletin on this subject, which will be of interest in solving a wide variety of problems.

For further information, address The American Engineer, reference No. 354.

WATERPROOFING COMPOSITION

This is a new ready-mixed coating for concrete, brick and stucco exteriors, basement walls, etc. It is claimed that one coat will cover any surface, that it is elastic, durable and economical, and seals cracks, crevices and leaky joints. It is an oil-resin base and upon drying, becomes hard and is washable and sanitary.

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For further information, address The American Engineer, reference No. 355.

NINE-INCH PRECISION LATHES

This 36-page full color catalog completely describes a line of 9" engine lathes and tool-room lathes, as well as 9" precision turret lathes which have ½ inch collet's. These models, according to the manufacturer, are well suited for the production of small precision parts for exacting tool-room work, and for general and specialized use in machine, maintenance, repair and laboratory shops for the working of all metals, plastics, and other machineable materials. Lathe tools, accessories, motors and controls and attachments for special classes of work are illustrated and described in detail.

For further information, address The American Engineer, reference No. 362.

CHEMICAL FEED SYSTEMS FOR BOILER WATER TREATMENTS

This recently published bulletin explains why two distinct chemical feed systems for boiler water treatments are recommended for feeding Sodium Sulphide into feed water lines and for feeding other chemicals directly into the boiler.

The various units are listed by code number, by boiler pressure by make-up water requirements, etc., thus enabling the power engineer to select his unit of proper capacity, getting quotations, and buying and installing a new pump or some other piece of equipment. This is the first time such "packaged" units have ever been offered to the engineer.

For further information, address The American Engineer, reference No. 356.

OPPORTUNITIES FOR
ENGINEERS AND DRAFTSMEN

Pratt & Whitney Aircraft, in maintaining leadership in the expanding aircraft power plant field, requires qualified persons, preferably younger men, to participate and grow with its expanding engineering program on gas turbines and internal combustion engines.

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ANGLE MOLDING PRESSES

For molding plastic products requiring split molds, and for molding complicated parts by the transfer method, two newly designed Angle Molding Presses have been developed. Outstanding feature of these machines is the elimination of manual handling of split mold sections, thus reducing maintenance cost of such molds, and greatly increasing production rates.

These presses are of all-steel construction, except for the rams, which are close-grained cast iron. The self-contained radial piston pumping unit, powered by a fully-enclosed motor, can be placed on the floor, in any desired location. Automatic, single-cycle operation from push-button control panel, can be supplied if desired. This system incorporates all adjustments for operation of the machine to pre-determined automatic cycle.

For further information, address The American Engineer, reference No. 350.

ACID-PROOF CEMENTS

Considerable information regarding a complete line of Acid-proof Cements is contained in an 8-page bulletin which recently came off the press. It cites the various brands of cement, and their uses and several illustrations are given, showing how acid-proof linings should be installed.

There is much useful information in this bulletin, which will be found of interest to anyone using this class of cement.

For further information, address The American Engineer, reference No. 358.

MOULDED FABRIC BEARINGS

This 68-page bulletin lists unusual performance qualities of a line of moulded fabric bearings, and describes the advantages obtained by their use in difficult and unusual service conditions.

It also lists performance reports showing results over widely varying service conditions, and illustrates numerous types and sizes in which bearings are being moulded to required dimensions for installation without machining.

For further information, address The American Engineer, reference No. 360.

INDUSTRIAL PACKINGS

A new pocket-size folder on industrial packing serves as an unusually handy guide in selecting the most suitable packing for specific fluids, equipments and types of service.

Condensed description of each grade of this manufacturer's packing give the leading features and purposes and are accompanied by identifying illustrations. The center pages of the folder are so arranged as to combine a complete application chart of the packings with marginal references to descriptions of each of these packings. The folder also includes tabulations of approximate length per pound of each type of packing.

For further information, address The American Engineer, reference No. 361.

MOISTURE DETECTOR

A new type of Moisture Detector for detecting moisture in wood, plaster, masonry and many other materials, is now on the market. It takes advantage of the latest ideas in electrical circuits and electronic principles, all of which have been simplified and combined in a practical meter which covers the range of 7% to 25% moisture with an accuracy of plus or minus 1%.

The instrument is complete and self-contained. It is used by forcing the electrode needles into the material being tested and the reading is then taken by simply turning the dial knob until a small light above the dial flashes on at the correct moisture content. No special skill is required to operate the instrument.

It is self-contained, actual size being 7 x 4 x 8¾".

For further information, address The American Engineer, reference No. 352.

MACHINE RUNNING-TIME RECORDER

A bulletin describing a newly developed Machine Running-time Recorder has just come off the press. It contains complete information regarding the principle of operation and the methods of use.

Typical chart records are illustrated and other photographs help to make clear the mechanical features of the instrument.

For further information, address The American Engineer, reference No. 365.

INDUSTRIAL USE OF SYNTHETIC RUBBER

A 20-page, illustrated booklet describes a line of synthetic rubbers and their industrial usages. The bulletin is specifically directed to engineers, designers and production men, and its clear and readily understandable treatment of the technical aspects of the synthetic rubber utilization will also appeal to industrial executives.

The first part of the bulletin is devoted to a pictoral resume with a discussion of the processes by which these special-purpose synthetic rubbers are manufactured, the characteristics of the crude polymers and the company's engineering services, and other points of interest.

The properties and applications of vulcanized compounds of the three types of synthetic rubbers now available, together with a center spread table giving the complete range of the properties, along with detailed explanatory notes are given in the latter part of the bulletin. Other tables include: (1) the qualitative resistance of the 3 compounds now available to 45 oils, solvents and chemicals; (2) the actual physical properties of 12 specific representative compounds of 2 of the types, and (3), effects of oil and heat aging on the physical properties of the compounds, and (4) effects of prolonged fluid aging on two typical compounds. Special types of compounds, such as hard rubbers and cements are discussed, along with their properties and uses.

A final table lists 30 suggested applications for the synthetics in the automotive, aviation, petroleum, machinery, chemical, textile, printing, marine and railroad industries, while the last several pages are complete with illustrations of many of these uses.

For further information, address The American Engineer, reference No. 359.

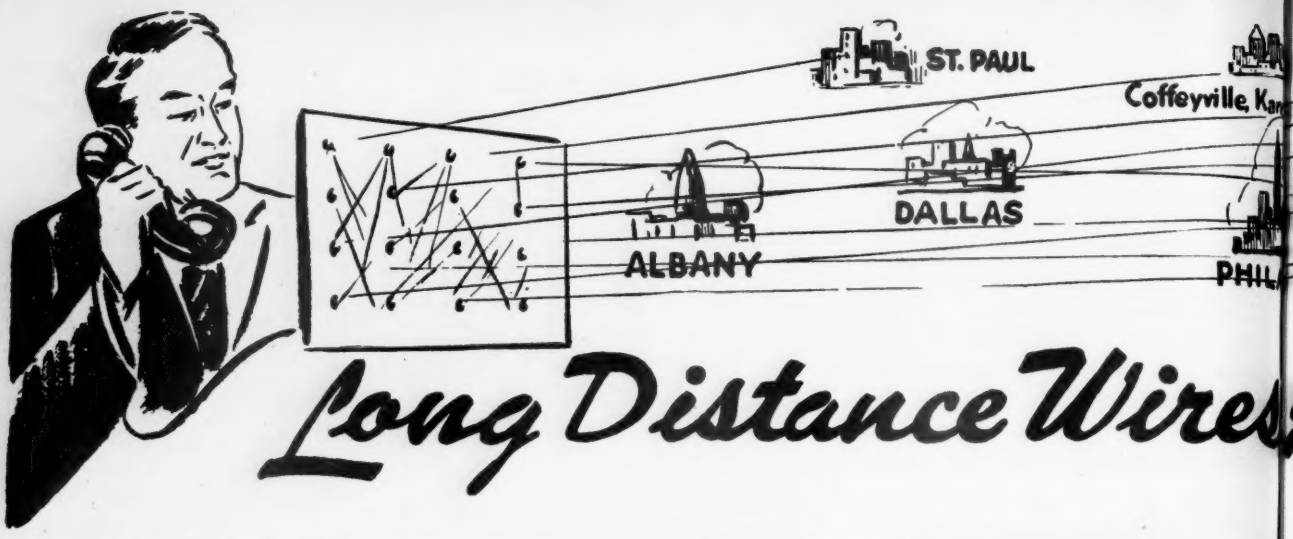
REFRIGERATION COMPRESSORS

A line of vertical, 2-cylinder, single-acting, enclosed 5 x 5 refrigeration compressors is described in a 6-page, 2-color bulletin recently published.

Complete specifications and many illustrations are given in the bulletin.

For further information, address The American Engineer, reference No. 357.

(Continued on page 32)



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ALL of them—hard-boiled, practical, cost-conscious buyers—are calling us NOW, from all over the Country, and ordering shipments of:

- **POWER SHOVELS—2 to 4-cu. yd. POWER SHOVELS**
- **SMALL SHOVELS—⅝ to ¾-cu. yd. TRUCK SHOVELS**
- **MONIGHAN DRAGLINES • OVERHEAD CRANES • TRUCKS**
- **TRACTORS and BULLDOZERS (including the popular D-7 and D-8 Types. CATERPILLARS, ALLIS-CHALMERS, CLETRAC and Others).**

WHY?—Because they know we have long lists ready to draw from. And they appreciate our PRINTING ALL PRICES.

They know that the VALUES ARE GOOD, and never will be better.

Look Over This List Below and Satisfy Yourself.

JULY, 1945 SPECIALS

⅝ yd Northwest Model 20 shovel and dragline, rebuilt and guaranteed, late model.

¾ yd recent model Insley K-10, excellent condition shovel, crane, backhoe, clamshell bucket, 60 day guarantee.

½ yd P&H Model 150, excellent condition, shovel, backhoe, crane, two clam buckets, 10 wheel trailer.

½ yd Northwest Model 2 shovel built in 1936.

⅜ yd diesel Link-Belt Speeder shovel, 1940-1941 model excellent condition.

½ yd Unit shovel and backhoe combination, ¾ swing, real nice machine $2950.

Two Byers Bearcat ⅜ yd skimmer, crane and shovel combination $1650. each.

Half swing Insley 1/3 yd shovel in rather good operating condition at a bargain price $1950.

½ yd Bay City Model 25 shovel, backhoe combination, 1939 model, excellent condition.

½ yd Industrial Brownhoist scraper shovel $1450.

⅝ yd Bucyrus-Erie 10/20 shovel, backhoe and solid tired trailer $4900.

½ yd Byers ¾ swing, Hercules 4-cyl. engine $2750.

½ yd Byers Model 28—30′ boom. $3100.

½ yd General dragline, 35′ boom, Page dragline bucket, $4900, a 1938 General ½ yd shovel and dragline combination—35′ boom—½ yd bucket—6-cylinder Buda gas engine—rebuilt and guaranteed.

½ yd Model R Insley shovel ani backhoe combination, Condition only fair. Price $2950.

½ yd Link-Belt Speeder Model B-3 shovel in rather good operating condition at a bargain price, $3450.

⅝ yd Byers Model 66 crane, backhoe and fairleads. Condition good, $5900.

½ yd P&H Model 200. Fair condition. $2200.

¾ yd Bay City Model 16B—2 skimmer buckets and backhoe—half revolving. $1650.

A 1941 ¾ yd Byers Model 83 backhoe shovel and dragline combination—rebuilt and guaranteed.

A 1939 Marion Model 331 backhoe and shovel combination—¾ yd capacity—rebuilt and guaranteed.

Keystone ¾ yd excavator $1750.

Lorain Model 40 shovel and dragline combination—¾ yd capacity.

¾ yd Northwest Model 3 shovel and dragline—exceptionally good buy for $6450.

¾ yd P&H combination shovel and crane with fairleads—entirely rebuilt and guaranteed. Price $6300.

1 yd Byers serial number in the 3600s with 60′ boom—powered by Hercules. Price nominal—only $4400.

1 yd Late model Koehring Type 376—entirely rebuilt top to bottom. Price $8750 which is way under its market value.

1¼ yd Link-Belt 1935 or 1936 model, 65′ dragline boom, shovel attachments. Light weight Page bucket. $8400.

5 YD. SHOVEL
1943 P&H Model 1500

Electric Shovel in Excellent Condition, 34′ shovel boom, 22½′ dipper stick, 5 cu. yd. dipper bucket and electric cables go with the equipment.

Write, phone or wire for further information.

One ⅝ yd. P&H Model 300A shovel and dragline combination excellent condition. Rebuilt and guaranteed. Real buy for $5300.00.

¾ yd Northwest Model 25 backhoe and dragline combination. Built in 1939.

¾ yd Northwest Model 105. An old unit but still in good operating condition with Climax 4-cylinder engine. $4850.

¾ yd P&H Model 204 dragline, 35′ boom, $4900.

¾ yd P&H 206, $2900, including bucket.

¾ yd P&H 400 Shovel, $4750.

1 yd Bucyrus-Erie 30B Diesel crane, powered by Atlas Diesel Engine. An old model but still good buy.

1 yd Lorain 60A shovel and dragline combination. Entirely rebuilt.

1 yd Lorain Model L55 in exceptionally good condition.

Two 1 yd Koehring Model 301.

1 yd Northwest Model 101 in fair condition, $3[illegible]

1 yd Diesel Osgood shovel and dragline. Caterpillar Diesel Engine. Unit is in good condition. $[illegible]

1¼ yd Byers Shovel and Dragline combination. Good condition. Price exceedingly low, $7900.

1¼ yd Lima Model 101 shovel and dragline combination. Price reasonable.

1¼ yd Lorain 73A shovel. $9450.

A rebuilt Lorain 75B shovel, crane and dragline combination. $11,900 with 60 day rebuilt guarantee.

1¼ yd Northwest Model 4 in real good condition and very reasonably priced.

1½ yd Northwest Model 6 shovel and dragline combination, with rebuilt guarantee.

1—¼ yd Osgood shovel.

1—¼ yd P&H Model 700B shovel and dragline combination 60′ boom, $7400.

1—½ yd Bucyrus-Erie 37B shovel. One of the best buys we know of, $11,300.

1—½ yd P&H Model 700B shovel and crane combination, price $7300.

1—½ yd Koehring 501A shovel. Needs certain amount of repairs. Price way under its value, $7700.

1—½ yd Koehring shovel Model 502—Caterpillar diesel engine. Reasonably priced.

1—½ yd Lorain Model 77 shovel and dragline combination—45′ dragline boom—rebuilt and guaranteed.

2 yd Bucyrus-Erie diesel shovel and dragline combination—needs a certain amount of work. $12,250.

1—¾ yd Koehring 701 shovel and crane, powered by Caterpillar $13,000, diesel engine.

2 yd P&H Model 780 diesel dragline—75′ boom.

2 yd Page dragline—60′ boom—Page diesel engine.

2½ yd Bucyrus-Monighan walking dragline diesel powered 82′ boom.

3 yd Monighan diesel 90′ boom—Fairbanks-Morse diesel engine—condition good.

2 yd Bucyrus-Erie 43B electric tunnel shovels.

2 yd Bucyrus-Erie 50B electric shovel.

4 yd 120B Bucyrus-Erie electric shovel.

Two 3 yd Marion electric shovels, Model 125.

7 yd Bucyrus-Erie electric shovel.

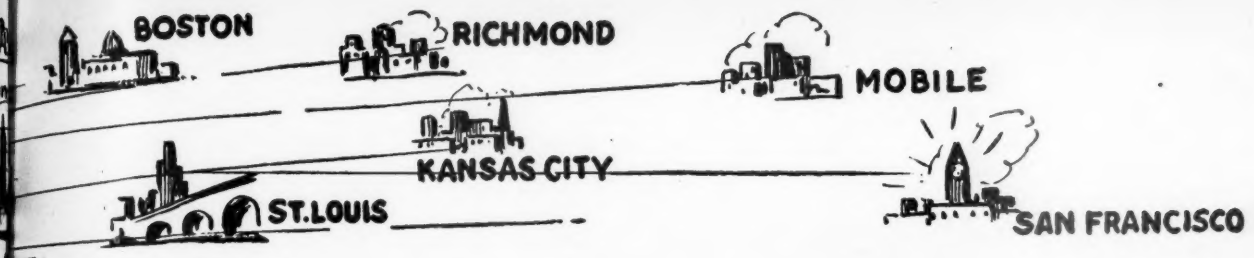
This is only a partial list of shovels, cranes we offer for sale.

We suggest you wire or telephone immediately for a summarized proposal.

Steam shovels from ¾ yd up to 8 yds.

Description will be sent upon request.

ECONOMY COMPANY IN[illegible]9-
NEW Y[illegible]



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TOURNAPULLS

6 Super C Tournapulls, 1942 Models, Maryland, $10,200.00 each.

5 Super C Tournapulls, rebuilt, West Coast, $10,300.00 each.

5 Model A 23 yd Tournapulls. A great bargain. Minnesota. $11,200.00 each.

2 Model C Tournapulls, $6300.00 each.

DUMP TRUCKS

4—Sterling 7½ ton 1940 Models, 10.50x24 tires, excellent condition. $4950.00 each.

4—1941 Sterling 7½ tons, 11.00x24 tires, $5500.00 each.

3—1941 Ford dump trucks, $1375.00 each.

3—Euclid 10 yd trucks with Cummins diesel engines, tire size 18.00x24, $5900.00 each.

3—20 yd Maxi two way side dump trucks—price upon request.

10—10 yd Euclid gas dump trucks, $4300.00 each. We can offer several other dump trucks and Complete listings on small and large diesel and gas dump trucks and semi-trailers will be sent upon request.

SPECIAL

1—Diamond No. 35 Rotor Lift Vibrator Gravel Crushing and Screening Plant, equipped with dual pneumatic tires. Engine ROD8-20 Model No. 35-SC6 Heavy Duty motor, radiator, pulley and parts completely installed. Extra screens, belts, etc. Powered by gas.

Attractively priced, which will be given upon request.

TRAILERS

4—Athey trailers with Linn tractors, late models, excellent condition, New England.

1—35 ton Williams trailer with 12 large pneumatic tires, rebuilt, $3800.00; $1000.00 under ceiling.

1—50 ton trailer with double drive Autocar, exceptionally good condition. Price upon request.

1—15 ton shovel trailer, 6 pneumatic tires 40x8, mechanical brakes, excellent condition $980.00.

1—1941 Freuhauf 14' dump semi-trailer 15½ yd capacity, excellent condition, $3900.00.

10 other small and large trailers, description will be sent upon request.

TRACTORS

4—International TD-18 tractors with hydraulic bulldozers, rebuilt and guaranteed condition. $6700.00 each.

1—D-8 Caterpillar Tractor with LeTourneau Angledozer and 12 yd LeTourneau scraper and other accessories. $12,350.00.

1—RD-8 tractor with bulldozer, double drum power unit, 12 yd scraper. $12,250.00.

1—D-8 Tractor with down pressure hydraulic bulldozer, serial 9G3546. $4700.

1—Caterpillar 60 Tractor with Bulldozer, 10' blade. $1950.00.

1—Model 4 Caterpillar Tractor with LaPlant Choate brand new hydraulic bulldozer. $3900.

1—R-2 Caterpilar Tractor with LaPlant Choate Bulldozer, $2100.

TRUCK CRANES

1—Quickway Shovel and Crane Combination, 25' boom, 1000x24 brand new pneumatic tires, 6 ton capacity.

1—P&H Model 300—8-10 tons, 10 wheeler AC Mack truck, 10.00x24 Budd wheels. Rebuilt guarantee.

1—Universal crane in excellent rebuilt condition on 10 wheeler Hendrickson truck, large tires.

1—P&H Model 203—7 to 9 tons, 6 wheels 900x24, 45' boom, $7600.00, a real bargain.

1—Speeder truck crane, 7½ tons, 25' boom, mounted on White Truck, $3900.

1—18 ton Byers truck crane on 10 wheeler specially constructed Mack truck, 65' boom, rebuilt and guaranteed.

1—Lorain 40—12 to 15 tons, 70' boom, 10 wheeler, special Mack chassis, 11.00x24 tires, $11,800.00

BUCKETS

1—½ yd Orange Peel bucket—rebuilt and guaranteed, $225.

1—1 yd. Blaw-Knox single line bucket, $620.00.

1—¾ yd Kissler clamshell bucket, rebuilt, $495.

1—½ yd Williams clamshell digging bucket, very good condition, $435.00.

1—½ yd Page dragline bucket.

1—½ yd Owen clamshell digging bucket.

1—⅜ yd Owens clamshell bucket.

1—1 yd Hayward clamshell bucket.

1—1½ yd Page clamshell bucket.

1—Haiss ½ yd rebuilt dragline bucket.

1—1½ yd Page dragline bucket.

1—2 yd Page dragline bucket.

1—Owens 5 yd clamshell bucket.

Additional listing on buckets—over 110 in all will be gladly sent upon request.

2½ yd. Diesel Shovel and Dragline. Built in 1938—Bucyrus-Erie 48B 60' dragline boom, complete shovel attachment.

Exceptional buy.

Phone at once if interested.

SHOVELS
TRUCK CRANES
TRACTORS
DUMP TRUCKS
BUCKETS
OVERHEAD CRANES
LOCOMOTIVE CRANES
MIXERS
TRAILERS
CRANE ATTACHMENTS
GRADERS
BULLDOZERS

Complete listing on each of these items will be forwarded promptly on request.

A 6-YARD DIESEL MONIGHAN 5W with 150' dragline boom. Phone for further information.

19-B Vanderbilt Ave., N.Y.C.

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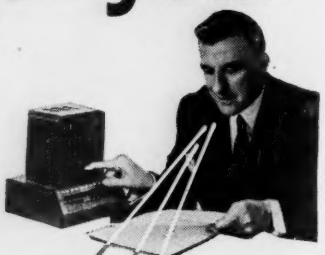

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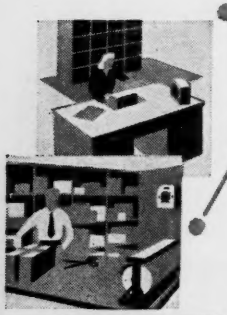

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BUY MORE WAR BONDS

A NEW DEVICE FOR THE MEASUREMENT OF THE THICKNESS OF SOLIDS AND FOR DETERMINING LIQUID LEVEL AND LIQUID DENSITIES

Secrecy has recently been lifted by the Government on a new device utilizing electronic and radioactivity principles for the measurement of the thickness of solid metallic and non-metallics, and for determining liquid levels and liquid densities.

By means of this device, accurate inspection data is obtained in high-pressure pipe lines, boiler tubes, towers, pressure vessels, etc., without cutting or drilling. Accurate readings are made in 25 seconds with over 150 inspections per working day possible.

Another use for the new device is to locate interfaces of fluids of various densities, and to determine liquid level in sealed containers where the introduction of a mechanical float is not practical. Operating principles cannot be discussed in great detail, owing to Government secrecy limitations, but this much can be said: In operation, the instrument bombards the subject object with gamma rays which are derived from a needle containing a minute amount of radium. These gamma rays travel with the velocity of light and are, in fact, radiant energy. They are not deflected by magnetic or electrical fields. The rays are scattered by the electrons of the atoms in the material being inspected. Some of these rays emerge, or are back-scattered from the material on the same side as they entered. The intensity of the back-scattered radiation increases as a direct function of the thickness of the material at the spot being measured. By measuring the intensity of this back-scattered radiation, the thickness of the material, whether it be steel, aluminum, plastic, brass, wood, or any other substance, can be obtained with extreme accuracy. By the same means, liquid levels and liquid densities are also obtained.

The apparatus can be operated and handled by one man, as it weighs approximately forty pounds. An 18-page bulletin gives considerable information concerning this new instrument.

For further information, address The American Engineer, reference No. 364.